A Thesis in General Surgery

A CLINICAL STUDY OF ACUTE SCROTAL SWELLINGS

Submitted in partial fulfillment of the
Requirements for the Degree of
M.S General Surgery
(Branch I)

Kilpauk Medical College
The Tamilnadu Dr. M.G.R Medical University Chennai

APRIL – 2015

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation titled "**A CLINICAL STUDY OF ACUTE SCROTAL SWELLINGS"** is a bonafide and genuine research work carried out by me under the guidance of Dr.V.Chitra, M.S., Professor, Department of General Surgery, Kilpauk Medical College, Chennai.

This dissertation is submitted to THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY, CHENNAI in partial fulfillment of the requirements for the degree of M.S. General Surgery examination to be held in April 2015.

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The Institutional Ethical Committee of Govt. Kilpauk Medical College, Chennai reviewed and discussed the application for approval "A Clinical Study of acute scrotal swellings" – For Project Work submitted by Dr.R.Veerappan, MS (GS), PG Student, KMC, Chennai-10.

The Proposal is APPROVED.

The Institutional Ethical Committee expects to be informed about the progress of the study any Adverse Drug Reaction Occurring in the Course of the study any change in the protocol and patient information /informed consent and asks to be provided a copy of the final report.

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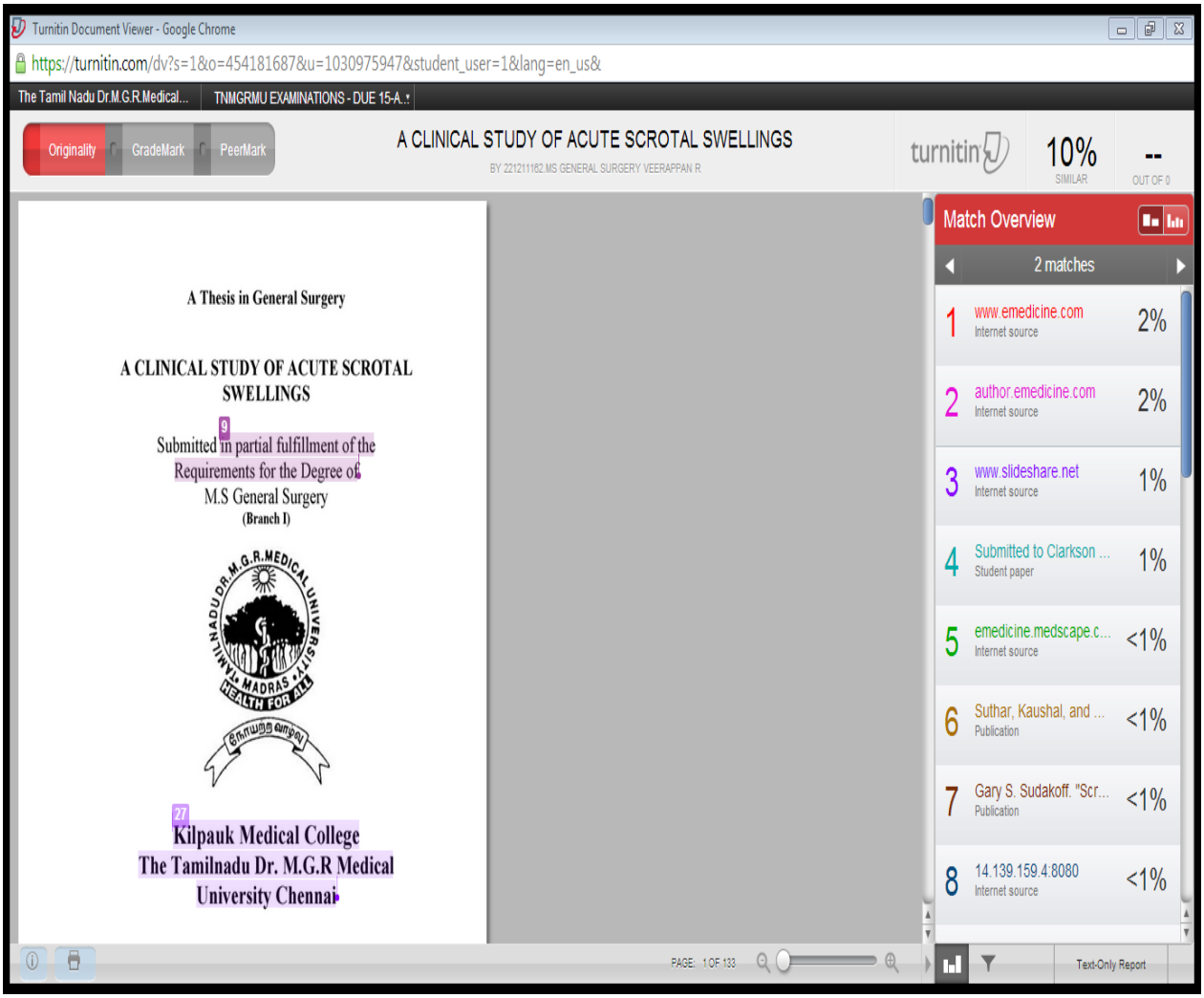
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Last but not the least, I thank God for being the prime force in guiding me throughout.

ABSTRACT

Background and Objectives

Acute scrotal swellings though commonly encountered, many a times an accurate diagnosis is not made and the precious testis is sacrificed.

Aim of the study is

1) To study the incidence of etiological factors which cause acute scrotal swelling.
2) To study the correlation of clinical features with operative findings.
3) To study the distribution among different occupation and age groups.
4) To study the different modalities of management of different etiologies.

Materials and Methods

Patients reporting to outpatient department of General surgery with acute swelling and pain in scrotum, patients admitted as inpatient for same complaints or any other patients presenting with similar complaints during some other ailment from April 2014 to September 2014.

Age, occupation, clinical features, duration, investigations, different etiologies, operative findings, postoperative complications will be documented and analysed.

Results

Epididymo-orchitis was found in 32 cases, followed by Epididymitis in10 cases and Pyocele in10 cases. The maximum incidence occurred in the 3rd decade. Similar complaints in the past and urinary symptoms are predominant predisposing factors. The average duration of symptoms in case of epididymo-orchitis was 6.06 days, whereas in Fournier's gangrene it was 3 days. Urine analysis and hemogram were inconclusive but supportive. Ultrasound of scrotum was diagnostic in most cases. The average period of hospitalisation was found to be more in Fournier's gangrene (21.75 days).

Conclusion

The commonest etiology leading to acute scrotal condition is epididymo-orchitis followed by epididymitis and pyocele. History of similar complaints in the past and urinary symptoms are the predominant predisposing factors. Investigations are not conclusive but supportive. Acute scrotal swellings affect the whole life of the patient in the aspect of

sterility. So, it needs meticulous examination, proper evaluation and aggressive management.

Key words

Acute Scrotal swelling; Epididymo-orchitis; Fournier's gangrene; Pyocele

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INTRODUCTION

Acute Scrotum[1] is defined as "the acute onset of pain and swelling of the scrotum that requires either emergency surgical intervention or specific medical therapy".

Numerous acute scrotal conditions may present in a similar way, torsion testis is by far the most significant. As the duration of torsion increases, the chance of testicular salvage decreases, so torsion testis is a true surgical emergency. Various other conditions that manifests in similar way to torsion testis include epididymo-orchitis, torsion of appendix testis, hematocele, testicular trauma, Henoch Schonlein purpura, strangulated inguinal hernia etc.

The diseases whose primary located elsewhere can present with symptoms and signs in the scrotum. Examples are meconium peritonitis and hemoperitoneum. Similarly a testicular torsion can present with nausea, vomiting and pain abdomen. This infers that scrotum cannot be seen as an area isolated from rest parts of the body.

In most of the cases, it should be possible to arrive at a reasonably accurate diagnosis based on clinical examination and detailed history along with the proper usage of imaging studies.

For the management of acute scrotum, a variety of investigations have been described. These include a set of tests from simple urine examination to more advanced forms like ultrasonography, colour doppler studies and radionuclide scanning.

Despite all the investigations, most of which are available in only some centers in India, early exploration of scrotum remains to be one of the most predominant diagnostic as well as therapeutic modality.

OBJECTIVES OF THE STUDY

- To ascertain the different types of acute scrotal swellings in Government Royapettah Hospital, Kilpauk Medical College.

- To study the incidence of etiological factors which cause acute scrotal swellings.

- To study the distribution among different age groups and occupation.

- To study the correlation of clinical features with operative findings.

- To study the different modalities of management for different etiologies.

REVIEW OF LITERATURE

Most studies were performed in children. In a study conducted by Yusuf et al,,[27] on 195 boys from Jan 1983 to March 2003, EPO was commonest (37%) followed by torsion testis. Patients presented averagely after 2.11 days . In those diagnosed with torsion testis, testis was salvaged in only 37%.

In another study conducted by Yang et al,,[26] on 1228 cases from 1990-2008, torsion of testicular appendix was commonest, seen in 918 patients. In torsion testis, testis was salvaged in 30.1%. Due to paucity of studies in adult age group, this study was chosen for dissertation.

EMBRYOLOGY OF THE SCROTUM AND TESTIS

Development of scrotum and testis [2] :

Testicular development is from the corresponding genital ridge ,that is formed from coelomic epithelium. Sex cords multiplies from this specific epithelium and grows into mesenchyme which is underlying ,soon canalizes forming seminiferous tubules. In the meantime, the primodial germ cells goes to testicular developing region and becomes embedded in the seminiferous tubules.

Sex cords that are not canalised , forms the basis for derivation of the testicular interstitial cells.

Tunica albuginea is a dense layer of fibrous tissue derived from the mesenchymal cells around the developing testis.

The rete testis is formed by the anastomosis which is established between the ends of seminiferous tubules. This will form a relation with persistent mesonephric duct which gives rise to vasa differentia.

Epididymis is formed by the coiling of the cranial end of mesonephric duct. Vas deferens is formed from the distal part of mesonephric duct.

The mesonephric duct in its lower end and on either sides gives rise to a diverticulum called as Seminal vesicles .

The portion of mesonephric duct between the origin of this diverticulum and prostatic urethra, gives rise to ejaculatory duct.

The male and female ducts of the embryo will be present at the seventh week of gestational period. The oviduct and the uterus develops from the mullerian duct system in the normal female foetus.

The epididymis and vas deferens in the male foetus are developed from wolffian duct system. Until eighth week , external genitalia are bipotential. After that the urogenital duct remains open to form the female genitalia or disappears to form the male genitalia.

The functional testis in embryo secretes testosterone and mullerian regression factor (MRF). The internal and external genitalia of male develops in the presence of this functional testis. Mullerian ducts are inhibited by the mullerian regression factor (MRF).

The vas deferens and related structures are developed by the combined action of testosterone and mullerian regression factor (MRF). The male external genitalia induction is by the individual action of testosterone.

Development of the scrotum [2]

The appearance of bilateral genital swellings called as labioscrotal folds leads to the development of the scrotum. The labia majora in females and scrotum in the male originate from these common folds.

In males, at the end of third month, the growth and fusing of these folds in the midline forms the scrotal sac. The line of fusion is

indicated by the raphe scroti. The scrotal skin is ectodermal in origin. The other layers of the scrotum are mesodermal in origin.

Descent of the testis

The lumbar region of the posterior abdominal wall is the relationship for the development of testis. The descent of the testis is gradual during the foetal life.

By the third month of intrauterine life ,testis reaches the iliac fossa. Upto seventh month, testis lie at the site of deep inguinal ring. During the seventh month, testis passes through the inguinal canal. By the end of eighth month testicles are normally placed in the scrotum.

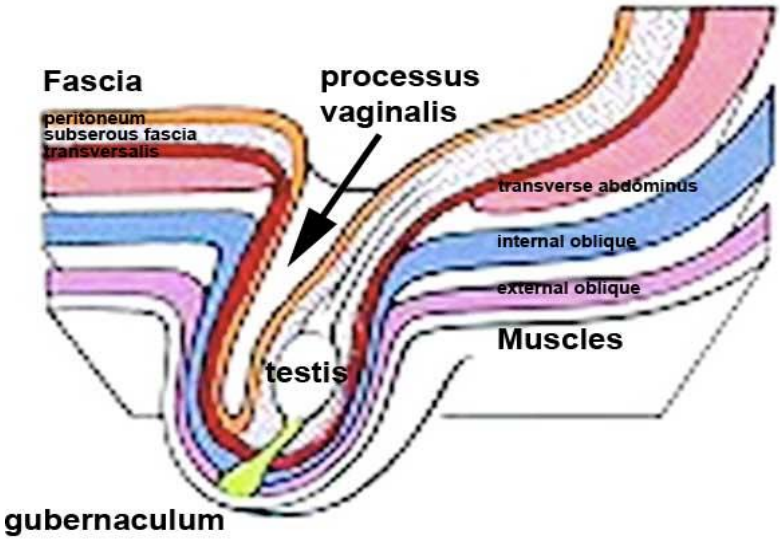


Diagram showing the descent of testis into the scrotum

Factors helping in descent of the testis

They are

1) Differential growth of body wall
2) Formation of inguinal bursa

The layers of the abdominal wall on either side shows an outpouching towards the scrotum during the eighth month of gestational period. There will be a progressive increase in depth and size of this pouch and finally reaches the base of the scrotum.

Testis which descends ,enters this pouch for reaching the scrotum. The formation of pouch is before the entrance of testis. The inguinal canal is formed by the cavity of this inguinal bursa . The different layers of its wall will form the coverings of spermatic cord and testis.

3) The gubernaculum

   This mesenchymal band extends from the inferior pole of testis to the scrotum .Gubernaculum plays a vital role in the testicular descent in the following ways:

   a) Increase in size of the embryo has no corresponding increase in length of the gubernaculum. Testis

assumes a lower position as this shortening pulls it progressively down.

b) It causes dilation of inguinal bursa.

c) The continuous pathway for testicular descent is provided by gubernaculum

4) Processus Vaginalis

This is a peritoneal cavity diverticulum. In the inguinal canal and scrotum , it grows actively into the gubernaculum. During the testicular descent, there will be invagination of processus vaginalis from behind and then becomes the tunica vaginalis, by the time it loses the peritoneal cavity connection.

5) The testicular descent is mostly influenced by the harmone secretion from pars anterior of the hypophysis cerebri.

ANATOMY OF THE SCROTUM AND CONTENTS

SCROTUM [3,4]

The scrotum is a bag containing the epididymis , lower part of spermatic cord ,right and left testis. A ridge or median raphe continues forward on to the penile undersurface and backwards in the midline of perineum to the anus.

Left side hemiscrotum hangs lower than the right.

Layers of the scrotum

From inside are

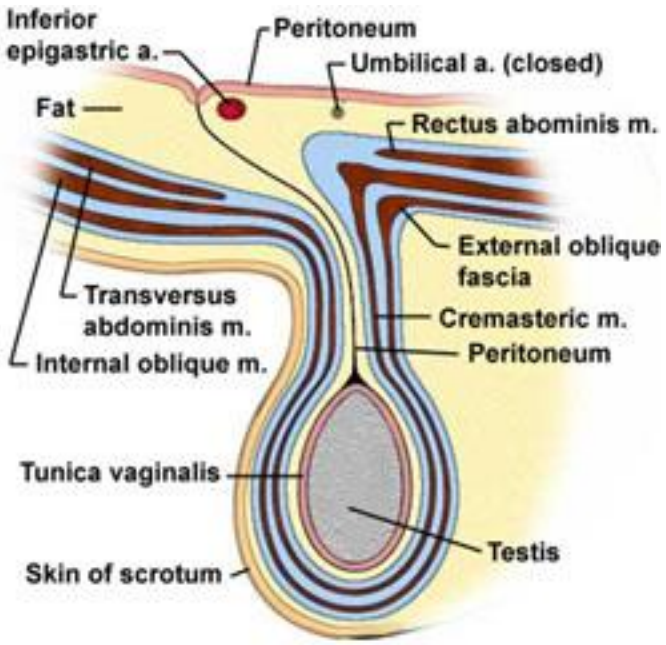
Internal spermatic fascia

Cremastric fascia

External spermatic fascia

Dartos muscle (replacing the superficial fascia)

Skin



Picture showing the coverings of testis and spermatic cord

Dartos muscle

It is a smooth muscle related to a loose areolar tissue . The size of the scrotum will be shrunken and corrugated ,when this muscle contracts. This happens in a young and robust person, during sexual stimulation and under the influence of cold.

By the relaxation of this muscle , the scrotum becomes elongated and flaccid . This occurs in old and debilitated persons and under the influence of warmth.

Blood supply

Femoral artery branches supplies the scrotum. These are

1) Cremasteric branch of the inferior epigastric artery
2) Deep external pudendal artery
3) Scrotal branches of internal pudendal artery
4) Superficial external pudendal artery

Lymphatic drainage

Superficial inguinal nodes forms the lymphatic drainage system of scrotum.

Nerve supply

The Genitofemoral nerve's genital branch and the ilioinguinal nerve supplies the anterior one third of the scrotal wall.

Posterior femoral cutaneous nerve of thigh's perineal branch and posterior scrotal nerves supplies the posterior two third of the scrotum. The sympathetic fibers which passes through the genitofemoral nerve

(genital branch) supplies the dartos muscle. Dartos is involuntary.

Scrotal Contents

Testis [3,4,5]

The male gonad is the testis , suspension in the scrotum is by the spermatic cord. The testis lies obliquely. The lower pole lies backwards and medially. The upper pole has a tilt forwards and little laterally. The left testis is little lower level than right.

The average mathematical dimensions of the testis are 2 cm in anteroposterior diameter, 2.5 cm in breadth, 4-5cm in length. Weight of the adult testis is about 10- 15 gm.

The appendix of testis is a small ovoid body in the upper pole of testis.

Coverings of the Testis

From inside to outside - Tunica vasculosa

- Tunica albuginea
- Tunica vaginalis

Tunica Vaginalis

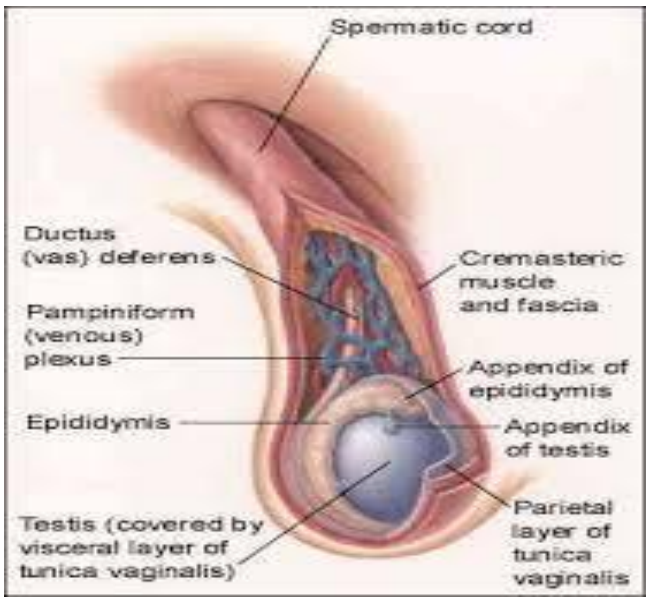
The lower portion of the processus vaginalis which is persistent represents the tunica vaginalis. The testis invaginates this layer from behind , so it has got a visceral and parietal layer. The whole testis except the posterior border is covered by tunica vaginalis.

Tunica Albuginea

All around the testis is covered by this dense white fibrous coat. Visceral layer of the tunica vaginalis covers the tunica albuginea except posteriorly, this is where the testicular nerves and vessels enter the gland. Mediastinum testis is a incomplete visceral septum formed by the thickening of the posterior border in the tunica albuginea. The testis is incompletely divided into 200- 300 cone shaped lobules.

Tunica Vasculosa

Lobules of the testis are lined by this inner most vascular coat.



Anatomy of testis

Microscopic structure of the testis

The testis has a glandular part consisting of 200- 300 lobules in each testis comprising

i) Seminiferous tubules

ii) Interstitial cells between lobules

There are about 400- 600 seminiferous tubules in each testis.

When the tubules are stretched out , each tubule is about 0.2 mm in diameter and 2 feet in length.

Lining of each tubule is by :

a. Spermatogenic cells (majority)

   These are spermatozoa, spermatids, secondary spermatocyte, primary spermatocyte and spermatogonia.

b. Sustentacular cells of Sertoli.

   At the apices of lobules , the seminiferous tubules are joined together and form 20-30 straight tubules. The straight tubules enters the mediastinum and anastomoses with each other ,so as to form a cluster of tubules. This network of tubules is called as rete testis. About 12- 30 efferent ductules arise from the rete testis. The head of the epididymis has lobe formed from the efferent ductules in proximity with the superior pole of the testis. The ductules enter into the common duct of epididymis, which coils on itself to form tail and body of epididymis. These structures are continuous with the ductus deferens.

Arterial supply

At the level of L2 vertebra ,abdominal aorta gives rise to testicular artery. The testicular artery reaches the deep inguinal inguinal ring by descending on the posterior abdominal wall ,as it enters the spermatic cord.

It divides into multiple small branches near the posterior border of the testis. Tunica albuginea is pierced by the larger branches and crosses the testicular surface for ramification in the tunica vasculosa.

Venous drainage

The pampiniform plexus is formed by the multiple veins arising form each testis. The plexus sorrounds the testicular artery in its anterior part, vas deferens and its artery in its middle part and the posterior part is isolated.

The condensation of the pampiniform plexus forms 2 veins at the deep inguinal ring and 2 veins near the superficial inguinal ring. The testicular artery is accompanied by these veins. At the end , single vein which is formed drains into left renal vein on the left side and inferior vena cava on the right side.

Lymphatic drainage

At the level of L2 vertebra, lymphatics ascend in combination with the testicular vessels and drain into para and pre aortic lymph nodes. It drains into the left virchows nodes via the thoracic duct .Common iliac group of nodes is the drainage site for mediastinum of testis.

Nerve supply

The segment T10 of the spinal cord give rise to the sympathetic nerves which supplies the testis. They pass through the aortic and renal plexus. There are both afferent and efferent nerves in the system.

EPIDIDYMIS

The epididymis is a mass that act as a reservoir of spermatozoa formed by highly coiled tubules. Its upper end is connected to the superior pole of the testis by efferent tubules, which is enlarged called as head. Middle part is the body and the inferior part is the tail.

The highly coiled efferent ductules forms the head. The duct of epididymis is the single duct which forms the body and tail of epididymis. The tail is in continuous with the vas deferens.

Vessels and nerves

The descending aorta gives rise to a direct branch called testicular artery, that supplies the epididymis along a branch that anastomoses and adds force to the artery to vas deferens.

The lymphatic and venous drainage are identical to that of the testis.

The testicular plexus, fibers of which arises from segments T 11 to L1 of cord which contains the sympathetic nerves.

Appendix of epididymis

Attached to the head, is a pedunculated , small and rounded structure called appendix of the epididymis. The cranial end of the mesonephric duct is represented by this.

Acute scrotal conditions

There are wide variety of causes which leads to acute scrotum. These include

1) Epididymoorchitis
2) Orchitis
3) Epididymitis
4) Torsion testis
5) Torsion of appendix epididymis
6) Torsion of appendix testis
7) Gangrene of scrotum - Fournier's gangrene
8) Infection of the scrotum – Abscess of the scrotal wall

   Scrotal erysipelas

9) Trauma to scrotum
10) Miscellaneous

    Idiopathic scrotal edema

    Scrotal fat necrosis

    Testicular tumour

    Ischemic orchitis

    Henoch – Schonlein purpura

    Pyocele

Scrotal wall cellulitis

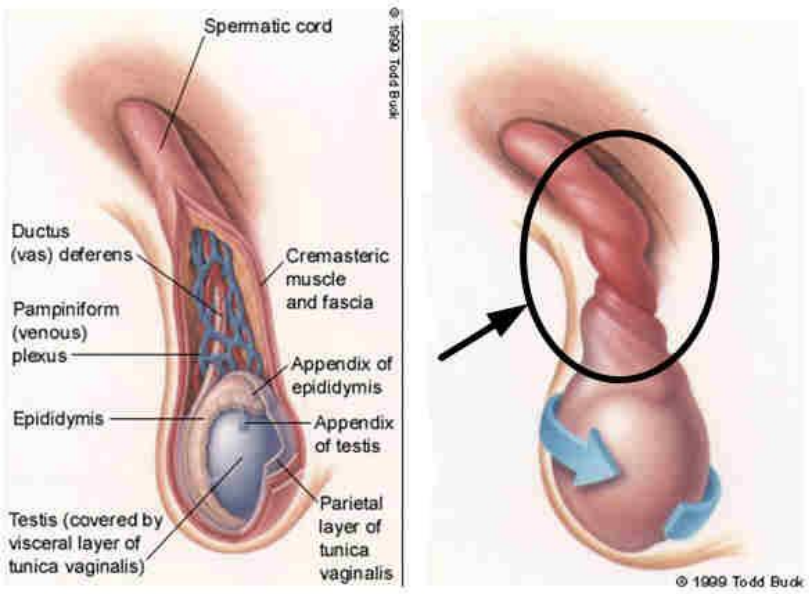
Hematocele

Testicular abscess

TORSION OF THE SPERMATIC CORD (TORSION TESTIS)

Torsion of the spermatic cord or testicular torsion is a real surgical emergency. It causes strangulation of blood supply to the gonad followed by testicular atrophy and necrosis. It is frequent in prepubertal males between the age of 12 to 18 years [7].

Acute swelling of scrotum in children indicates testicular torsion until proven otherwise.To make an accurate diagnosis in approximately two third of cases history and physical examination are sufficient.



Picture showing the torsion of spermatic cord

Frequency

Extravaginal torsion

It represents nearly 5 percent of all torsion cases. This type noted in the neonatal period and most commonly arises prenatally in the spermatic cord, that are proximal to the tunica vaginalis attachments. About 20 percent of cases are synchronous and 3 percent are asynchronous bilateral.

Intravaginal torsion

It represents about 16 percent of patients with torsion presenting to the emergency department with acute scrotum. This type of torsion frequently seen in older children. Peak age of incidence is 13 years. The left testis is most frequently involved. Bilateral cases comprises 2 percent of all torsion testis.

Etiology

Extravaginal torsion

There may be free rotation of testis prior to the development of fixation of testis via the tunica vaginalis inside the scrotum or there may be deficient fixation due to lack of scrotal ligament, a remnant of gubernaculum.

Intravaginal torsion

1) The testicular suspension normally ensures firm fixation of the testicular epididymal complex posteriorly and effectively arrests twisting of the spermatic cord. The bell – clapper deformity [6,8] allows testicular torsion to occur because of absence of fixation, leads to the free testicular suspension within tunica vaginalis.

2) Mesorchium is a long mesentry between epididymis and testis that can lead to torsion testis , although rare.
3) The spermatic muscles which contracts shortens the spermatic cord and may lead to testicular torsion.
4) Undecended testis

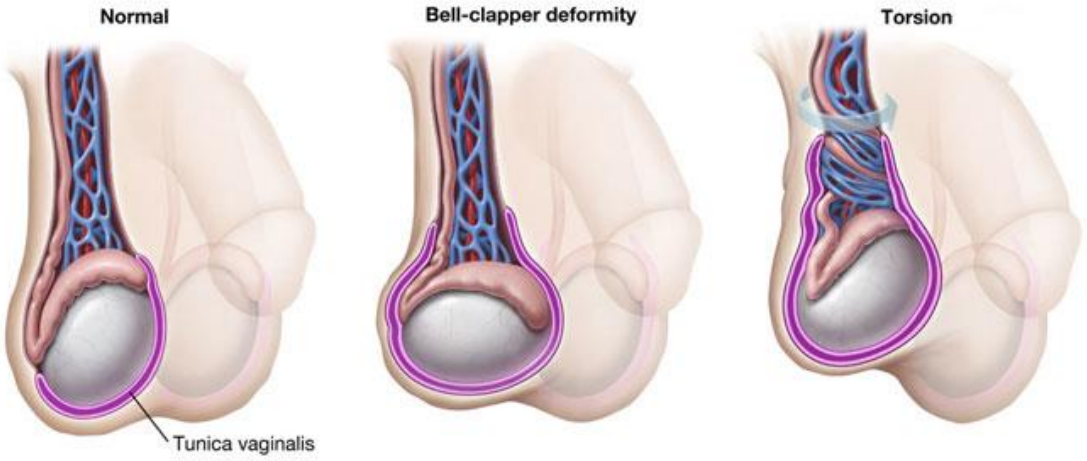


Image showing the bell –clapper deformity in torsion testis

Pathophysiology

Torsion of the spermatic cord may block the flow of blood to epididymis and testis. The degree of torsion testis may vary in between 180-270 degree.The speed in which pathological changes occur depends on obstruction of vascular supply.

When the venous return is blocked, the testis becomes congested and bluish, which increases the progression of torsion testis. There will be effusion that will be blood stained in the vaginal sac. If it does not resolves, testicular artery thrombosis occurs, the testis becomes gangrenous and prone for infection.

Duration and extent of torsion dominantly influences the immediate salvage rate and atrophy of testis. The salvage of testis mostly occurs, if the testicular torsion timing is less than 6 – 8 hours. If there is lapse of 24 hours or more the necrosis of testis develops in most patients [9,24].

Clinical

In an newborn male, prenatal torsion of testis presents as a hard ,firm mass which does not transilluminate. They are otherwise asymptomatic. The skin of the scrotum is characteristically fixed to the necrotic gland.

In older boys, the presentation of patient is as sudden onset of severe pain in testis followed by scrotal or inguinal swelling. The testicular pain may occur at rest or related to physical activities or sports. There may be similar previous episodes , which sometimes suggest intermittent torsion of testis. As the necrosis becomes complete pain may become less.

Gastrointestinal symptoms with nausea and vomiting may be present in approximately one third of patients. Testicular torsion may be preceeded by the scrotal trauma or other scrotal disease (including torsion of epididymis or appendix of testis) in some patients.

The physical examination reveals a swollen hemiscrotum with erythema. There is tender, swollen and high riding testis. The diagnosis of testicular torsion is supported by the absence of cremastric reflex. In time, scrotal wall erythema, ecchymosis, reactive hydrocele becomes more prominent.

Differential diagnosis

1) Epididymoorchitis, orchitis or epididymitis
2) Torsion of epididymal or testicular appendix
3) Scrotal trauma
4) Other acute scrotal conditions associated with pain and vomiting such as strangulated hernia and acute appendicitis.

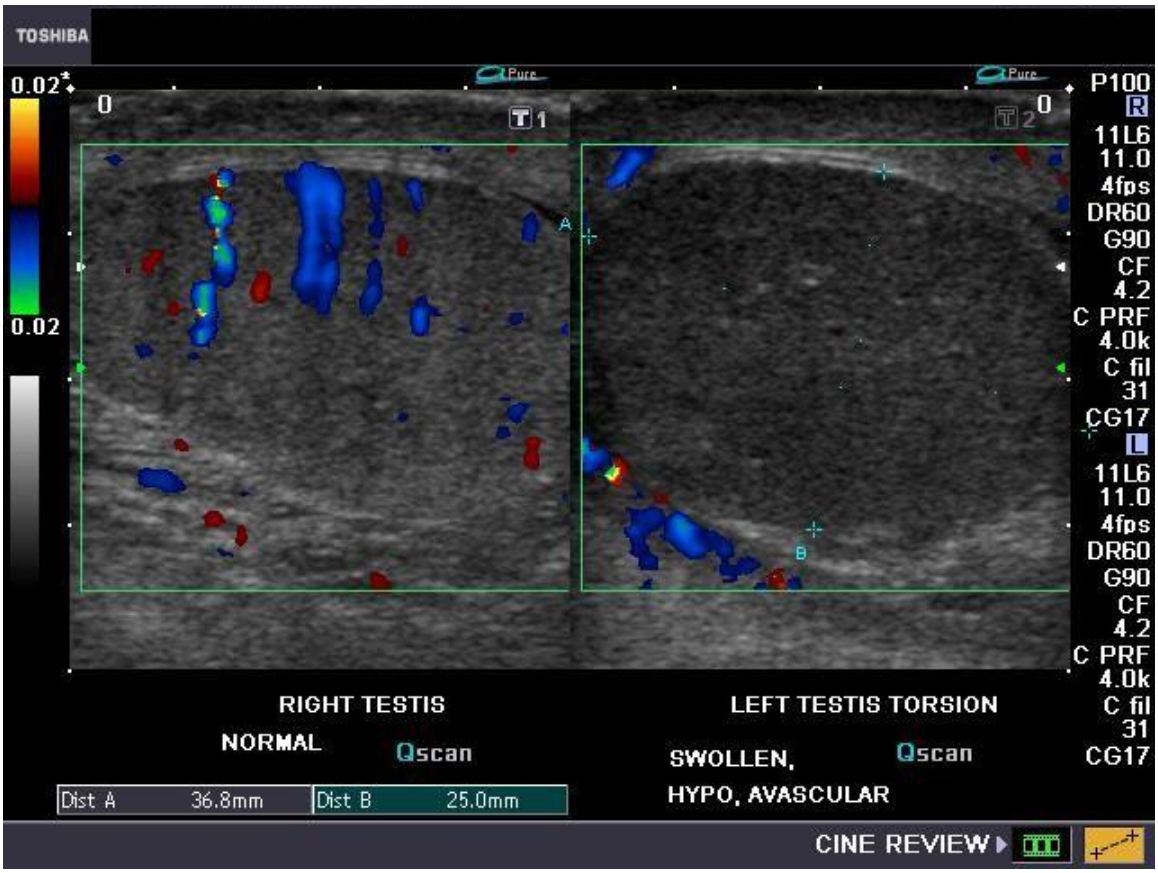
Work up

Laboratory studies : urine culture and analysis –to exclude epididymitis and urinary tract infections.

Imaging studies [1,8,16,17] : (indicated when there is minor suspicion of testicular torsion)

i) Colour Doppler ultrasound of scrotum verifies arterial blood flow.

ii) Nuclear testicular scan contributes in differentiation of torsion from acute epididymitis by hot and cold spots.



Colour Doppler picture showing absent flow in torsion testis and normal flow in opposite testis

If surgeon feels that there is torsion testis , perform a immediate exploration. The negative exploration is always better than the total loss of salvageable testis.

TREATMENT

Medical therapy

Manual detorsion [6] - attempted when the patient is seen within few hours of onset of symptoms. The procedure is difficult due to severe pain by manipulation.

If successful (confirmation by ultrasound colour Doppler in a patient with complete recovery). There must be definitive fixation of the testis by surgery before the patient leaves the hospital.

Surgical therapy

According to age the treatment for torsion testis varies

- New born with testicular torsion.

  Early elective exploration with contralateral orchidopexy is done as bilateral (asynchronous or synchronous) torsion testis can exist.

- New born at birth with normal testis which undergoes torsion subsequently needs immediate scrotal exploration along with contralateral orchidopexy.

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Operative details

- The operation should be conducted through a midline scrotal raphe incision
- Reach the ipsilateral compartment ; then deliver the testis to untwist it.
- Examine the testis for viability.
    - Bleeding from arteries after incising tunica albuginea.
    - Intraoperative colour Doppler.
- Take away the necrotic testis to avoid excruciating pain and tenderness and need for preventing potential for subfertility due to development of auto immune phenomenon.
- Do contralateral orchidopexy [6] to prevent subsequent torsion of testis on other side.

Post operative details

Testicular prosthesis placement

This procedure is done is done in patients who requires orchidectomy because of unhealthy and nonviable testis . It is usually done after period of 6 months , until completion of healing.

The procedure is performed by the inguinal approach.

Outcome and prognosis

The success in the treatment of testicular torsion is calculated by immediate salvage of testis and testicular atrophy incidence. These are directly related to the degree and duration of torsion testis.

Duration of symptoms [1,9]

2 hours : does not produce changes significantly.

4 hours : stoppage of spermatogenesis for at least 60 days and severe depletion in number

6 hours : Spermatogenesis is lost with severe depopulation of leydig cells

10 hours : Functional elements will be completely lost.

12 – 24 hours : testicular survival is possible.

>48 hours : orchidectomy will be necessary as there is no hope for survival of testis

TORSION OF TESTICULAR / EPIDIDYMAL APPENDAGES

Torsion of testicular appendages represents nearly 5 % of acute scrotal pathology[1] . Located at the superior pole of the testicles are the appendix testis which is a mullerian duct remnant. The epididymal appendix , a wolffian duct remnant is situated at the head of the epididymis.

The appendix testis is affected about 10 times in increased frequency than the appendix epididymis. Torsion of testicular appendage is common in boys at age between 7 to 14 years [7] but it can occur at any age.

The pain in torsion of appendages is not typically as severe as torsion testis and is more often indolent in onset. The swelling and pain will gradually develop over the duration of few days. In torsed appendix, the systemic symptoms such as nausea, fever and vomiting are rare.

The clinical examination is variable early in the clinical course , usually shows a relatively normal to mildly erythematous hemiscrotum which is affected. The size of the testis is usually not significantly increased than the normal side. There will be a mild to moderate tenderness which is usually located at the upper pole of the testicle.

The torsed appendage may give a bluish discolouration which is seen through the overlying scrotal skin known as the blue dot sign [1,6] .

As the scrotal swelling and erythema follows, the physical findings becomes less specific , later on in its clinical course. The analysis of urine is generally negative.

The Doppler vascular study flow shows normal to increased flow for appendages torsion . In contrast, the torsion of gonad revels decreased flow. The radionuclide scan will be giving the similar results.

Management :

If torsion testis cannot be ruled out, the exploration of scrotum by surgery is mandatory.

If torsion testis is ruled out

Conservative management is advocated ;

Scrotal elevation

Analgesics

Strict bed rest

(as normal activity increases inflammation and pain)

Surgery

The unilateral exploration and simple excision of torsed unhealthy appendage should be done if conservative management fails.

ACUTE EPIDIDYMITIS, ACUTE EPIDIDYMO-ORCHITIS AND ORCHITIS

Inflammation of epididymis is termed as Acute Epididymitis. When severe infection extends to adjacent testicle, it is termed as acute epididymo-orchitis.

Pain and inflammation in the epididymis that lasts greater than 6 months referred as Chronic epididymitis. Less commonly acute inflammation involving only testis termed as epididymitis.

Frequency

One in thousand men affected annually.

Age

The most common occurrence of acute epididymitis is in patients of age 15-30 years and patients more than 60 years of age. The epididymitis in childhood is rare. The tumours of testis are more common in this childhood.

Orchitis due to mumps occur in 20-40% of boys at the prepubertal age affected with mumps. It is quite rare in prepubertal boys.

Causes:

Etiology of Acute EPO [11, 12]

- Non specific Bacterial infections

In children and men more than 40 years of age, urinary coliforms are more common. Neisseria meningitides or H.Influenza causes systemic infection which is rare in endemic areas. Tuberculosis can occur.

- Sexually Transmitted Diseases (STDs)

  Most commonly identified organism is chlamydia, Treponema pallidum, N.Gonorrhoea, Ureoplasma ureolyticum, Gardenella and Trichomonas vaginalis are observed.

- Urethro vasal reflex.
- Scrotal trauma can be a precipitating event.
- Obstruction

  Adults more than 40 years of age usually have a BOO or urethral stricture. Congenital abnormalities or various functional voiding problems are seen in children.

- Amiodarone epididymitis can occur in 3-11% of patients on this drug. This is secondary to concentration of drug typically in head of the

epididymis. The above phenomenon is dose dependent and occurs at dosage >200 mg daily. The histological analysis shows lymphocytic infiltration and total fibrosis of epididymal tissues.

- Other rare infections are CMV, Brucellosis, Blastomycosis, Candidiasis and Coccidiomycosis.

Etiology of Acute Orchitis

- Viral mumps is most common. Varicella, Coxsachie virus type A and echoviral infections are rare.
- Bacterial and Pyogenic Infection:

  With Klebsiella, Pseudomonas, E. Coli, Streptococcus and staphylococcus species are unusual.
- Mycobacterium tuberculosis, T.pallidum, M.lepra and fungal disease are granulomatous.
- Trauma.
- Idiopathic.

Pathophysiology

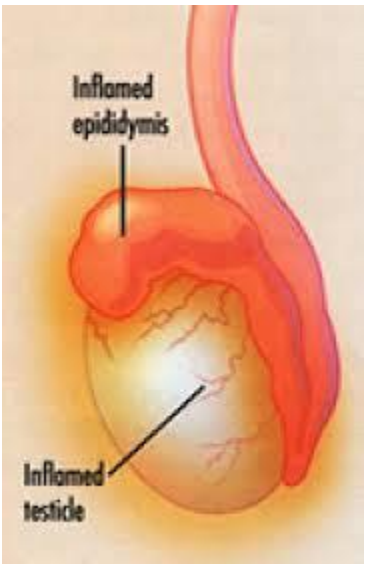


Image depicting the inflammation in epididymis and testis

Acute epididymitis is caused by a retrograde passage of urinary infection from the prostatic urethra to the epididymis through the ejaculating duct and via vas deferens.

Obstruction of prostatic part of urethra and congenital abnormalities leads to potential for urethro-vasal reflux which usually does not occur.

The common risk factors for acute epididymitis are indwelling catheter and instrumentation. There may be coexistence of Prostatitis and Urethritis.

Tuberculosis epididymitis might be the manifestation of genitourinary tuberculosis which usually occurs by hematogenous spread. Orchitis differs from epididymitis in that etiology due to viral pathogen is an important factor.

In men performing strenuous exertion epididymitis is common. The lack of opportunity to void, leading to a full bladder resulting in reflux into vas deferens.

CLINICAL FEATURE

HISTORY

Acute epididymitis and orchitis:

- Gradual onset of scrotal swelling and pain.
- urgency, dysuria, frequency.
- 25% of cases with acute epididymitis, fever and chills occur.
- Discharge per urethra may precede acute epididymitis for more than 30 days or it may not occur at all.

Mumps Orchitis :

- Myalgia, Fever, Malaise.

- Onset of orchitis is typical. It is preceded by 3-5 days history of Parotitis.
- In 30-40% of patients subclinical infections occur.

SIGNS

Acute epididymitis

- Induration and tenderness occurs first in the tail of epididymis, then the spermatic cord and the body or the ipsilateral testis (epididymo-Orchitis).
- Prehn Sign [1]: Elevation of the affected hemiscrotum exacerbates the pain of the torsion testis, relieves the pain of epididymitis. Manual detortion of the affected testis may drastically decrease the pain in children with testicular torsion.
- Physical examination findings will not be able to distinguish testicular torsion from epididymitis as the early torsion testis also involves the epididymis only.
- Mild scrotal cellulitis and erythema may be present.
- In advanced epididymo-orchitis, a reactive hydrocele is frequent, leads to difficulty in examination of scrotum.

- TB can cause draining sinus, focal epididymitis or classical beading of vas deferens.

Orchitis

- Induration, enlargement of testis and reactive hydrocele usually occur.
- No tenderness in epididymitis.

MANAGEMENT

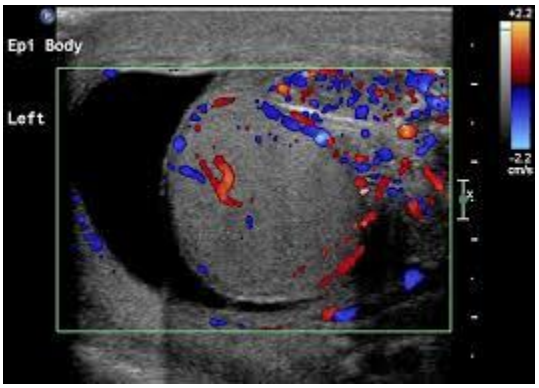
Investigations

Laboratory Studies

- Acute epididymitis and non viral orchitis
    - Blood culture in systematically ill patients.
    - Pyuria in analysis of urine (only in 25% patients) [10].
    - Increased WBC count.
- Mumps Orchitis
    - Immunofluorescent antibody testing for confirming the diagnosis if a doubt in clinical examination exists.
    - Culture findings and Analysis of urine are negative.

Imaging Studies [1,8]

- Colour Doppler ultrasound



Colour Doppler showing the increased vascularity in acute epididymoorchitis

  - In epididymitis, blood flow increases whereas no flow occurs with torsion. There will be good gonadal perfusion in testicular tumor.
  - The echogenicity around the testis will not be uniform in scrotal abscess.
  - Specificity for torsion is 100% and sensitivity is 80-100%.

- Radionuclide Scan (With Tc 99 m)
    - Acute epididymitis reveals an increased uptake of tracer, whereas in torsion testis there will be defect in uptake of tracer.
    - Difficulty, cost and availability limits usefulness with interpretation.
    - Specificity is 89-97% and sensitivity is 90-100% for torsion.
- Procedure
    - Cystourethroscopy : This procedure along with radiological evaluation is needed in the finding of structural abnormalities present in older adults and children, on clinical and radiographic suspicion.

TREATMENT

Medical Care

- Antibiotics, Analgesics, NSAIDS, Bed rest, scrotal elevation and support.

Surgical Care

- Scrotal exploration

- Indication – For complications of orchitis and acute epididymitis – if torsion testis not ruled out.
- Epididymotomy – in cases with suppurative epididymitis.
- Epididymectomy – In treating the pain of chronic epididymitis, this procedure has limitations. This is reserved for refractory cases only.

Complications of

- Acute epididymitis and bacterial orchitis.
  - Recurrence.
  - Chronic epididymitis.
  - Scrotal abscess and pyocele.
  - Testicular infarction : Swelling of cord and limit testicular flow.
  - Sterility.
  - Orchalgia.
- Mumps Orchitis
  - Orchalgia.
  - Sterility in 7-13% of patients.
  - Testicular atrophy leads to hypogonadotropic hypogonadism. which is observed in 50% of patients.

FOURNIER'S GANGRENE

Fournier's Gangrene is a soft tissue necrotic infection, that involves the superficial and deep fascia of the male genitalia.

Baurienne in 1764, initially described an idiopathic, increasingly progressive necrotizing gangrene of soft tissue in male genitalia.

In 1883, a Parision Venerologist[13], Jean Alfred Fournier described 5 patients with fulminating progressive gangrene of the male genitalia which were unexplained.

Diabetes mellitus was known to be the predominant predisposing systemic factor. Trauma of the genitalia and its related local factors accounts for the majority of the cases of Fournier's gangrene.

Etiology[13]: Idiopathic gangrene of the genitalia, as originally described, Fournier's gangrene has identifiable causes in about 95% of cases. The process of necrosis commonly originates with an infection in the skin, urogenital tract or anorectum.

Urogenital tract causes :	Urethral injury, Iatrogenic injury secondary to stricture manipulation, Periurethral abscess, lower urinary

	tract infection or extravasation of urine.
Anorectal Causes:	Perianal glands infection (ischiorectal abscess) .Less common are fissue-in-ano and perineal sinus, sigmoid vesical fistula and anal fistulas.
Dermatologic causes:	Scrotal pressure ulceration. Hidradenitis suppurativa, complication of inguinal surgeries, trauma. Less commonly, Fournier's gangrene has been reported as a consequence of systemic lupus erythematosis , crohn's disease, HIV or Malignancy.

Comorbid diseases which decreases the immunity leads to this condition are:

- Cirrhosis
- Diabetes Mellitus (most common)
- Morbid obesity

- Malignancies
- Vascular disease of the pelvis
- High risk behaviors such as intravenous drug usage or alcoholism.

Common Causative Microorganism include:

- Staphylococcal species
- Streptococcal species
- Anaerobic organisms
- Fungi
- Enterobacteriaceae species

Most cases of necrotizing infection have multiorganism that are responsible for the disease spread.

Pathophysiology

The causative factors which permits the portal of entry of the pathogens into the perineum.

The comorbid condition leads to compromised immunity which provides favourable environment for initiation of the infection.

The rapid spread of the disease is promoted by the virulence of the micro-organism.

Common causative micro-organism include

- Staphylococcal species
- Streptococcal species
- Anaerobic infections
- Enterobacteriaceae species
- Fungi

The rapid spread of the disease in the necrotizing infection is due to multiorganism infection.

Pathognomonic Findings:

- Nutrient arterioles has fibrinoid coagulation
- Necrosis of the deep and superficial planes
- Polymorphonuclear cell infiltration
- Microorganisms identified inside the tissues involved

Clinical Features

In elderly male in his 60-70 years of age , it is most common.

Severe pain and tenderness in the genitalia is the hallmark of Fournier gangrene.

Progression of clinical course is through the following phases.

- Severe pain and tenderness associated with edema of the skin overlying.
- Intense pain and tenderness with increasing erythema of overlying skin.
- Prodromal symptoms of lethargy and fever which continues for 2-7 days.
- Subcutaneous crepitus and overlying skin appears dusky.

- Purulent discharge from wounds with frank gangrene of a part of the genitals.

Systemic infections varies from nil toxicity to shock due to sepsis.

Extend of spread

Fournier gangrene may spread into the anterior abdominal wall and may extend upto the clavicle.

Branches of the internal and external pudendal arteries supply the scrotum. There will be thrombosis of the vessels in Camper fascia except internal pudendal artery in the progression of disease.

The blood supply of the perineum and anterier scrotum is jeopardised if vessels are thrombosed. Internal pudendal artery supplies the posterior most aspect of the scrotal wall which remains viable.

The cord structures, urethra, testis and corpora cavernosa are usually spared in Fournier gangrene, while the deep and superficial fascia and skin are destroyed.

Work up

Lab studies: Complete Hemogram.

Leucocytosis

Hb%

Sepsis induced thrombocytopenia

Blood Glucose to detect pre-existing Diabetes mellitus

Coagulation profile – APTT – for coagulopathy induced by sepsis

PT

FDP

Platelet count

- Blood culture – In suspicion of septicemia
- Serum creatinine and Blood urea to assess renal function.
- More test to detect comorbid conditions.

Imaging studies

MRI – reveals greater soft tissue details than computerised tomography.

CT – Can detect minimal amounts of gas in soft tissue than plain x-rays and can show collection of fluid along the fascial planes that are deep.

USG – Can show gas or fluid within the soft tissues. Moreover it can detect the blood flow to the testis.

Radiographic imaging - Can reveal the presence of foreign body, soft tissues gas.

TREATMENT

Medical Therapy

Aggressive resuscitation – If the presentation of the patient is with systemic toxicity which manifests as organ failure / hypoperfusion. Diagnostic maneuvers can only be followed after aggressive resuscitation.

Institution of Broad Spectrum antibiotics covering streptococci, staphylococci, anaerobes and enterobacteriaceae group. Therapy with hyperbaric O_2 has limited role.

Surgical Therapy

1. **Incision and Drainage** – The most efficacious drainage is provided by incision along the median raphae. The line of incision can be extended into the thigh, buttock, inguinal or perineal region, which depends upon the involved areas.

2. **Excision of necrotic tissue** – All necrotic tissue must be excised, once the diagnosis is established. The opening of the skin should be wide to allow full extent exposure of underlying subcutaneous and fascial necrosis. Excision of skin should be done.
3. **Fecal Diversion** – If there is extensive perineal involvement fecal diversion should be considered at subsequent operative explorations to avoid the complication of fecal contamination in the wounds.
4. **Urinary Diversion** – Urethral Catheter is used to accomplish urinary diversion. When bladder drainage is not possible per urethra due to pathologies like urethral stricture and BPH, Suprapubic cystostomy is considered.
5. **Orchidectomy** – There will be sparing of testis in the necrotizing process. If the involvement of testis or its viability is questioned, orchidectomy is performed.
6. **Scrotal reconstruction** – The healthy granulation tissue will develop, if the infection is eradicated, scrotal reconstruction is undertaken.

   Options for reconstruction:

   - If possible primary closure of the skin.
   - Local skin flap coverage.

- Muscular flaps are used to fill the cavity (eg. ischiorectal space)

Complications

The important complication of Fourniers gangrene is, unresolved sepsis.

Outcome and Prognosis

Age of the patient may be inversely proportional to the survival of the patient.

Survival will also be inversely proportional to the extent of involvement of local tissues and systemic toxicity on admission.

Following reconstruction, prognosis is usually good. The involvement of penis will have pain in arousal in 50% of men. The scarring of genitalia will lead to limited mobility of the genitalia and pain.

The drainage of lymphatics may be impaired in extensive loss of soft tissue, thus cellulitis and edema may result.

INFECTION OF THE SCROTUM

1. ABSCESS OF THE SCROTAL WALL

Abscess which occur primarily in the scrotum are not common. These occur from infections of the sweat glands, hair follicles or through abrasions of the skin.

They are localised abscesses and are similarly treated, that is, with incision and drainage, warm wet compression. Antibiotics are used according to culture and sensitivity.

Eventhough these localised abscesses are disabling and painful, they are not serious. Abscesses of scrotal wall occurs secondary to extension of anorectal abscesses, periurethral abscess or suppurative lesions of the testis or epididymis.

The Scrotal Wall abscesses usually manifest several days after the instrumentation of urethra which is infected. Skin becomes edematous and red with fluctuant area.

Incision and drainage will lead to urinary fistula formation. The pus culture will reveal coliform and coccal organisms. Scrotal wall suppuration can be caused by Tuberculosis and specific infection which are rare.

The scrotal skin in its large portion may become necrotic. Broad spectrum antibiotics are usually given. Debridement may be necessary.

2. SCROTAL ERYSIPELAS

Scrotal erysipelas is a streptococcal infection with diffuse involvement of the subcutaneous tissue and skin that occurs as a result of wound, scrotal abscesses, surgical incision and fistulae.

It is seen in senile and debilitated individuals. This type of cellulitis is the result from retrograde infection of lymphatics into the scrotum, chancroid infection and other conditions.

Erysipelas in the adjacent skin or lower abdomen sometimes progress into the scrotum. The scrotal infection may be so severe that it becomes gangrenous. It normally develops from a small area with definitive margin and gradually involves whole scrotum.

The Scrotal tissue which is soft and loose becomes markedly tense, smooth, swollen and warm.

Blebs formation may be on the surface. Streptococcus is the usual infecting organism and a group of antibiotics are effective.

Elevation of scrotum along with scrotal support should be given to increase the circulation and reduce edema. Application of heat and wet solutions are not helpful and not indicated.

SCROTAL TRAUMA

Trauma to scrotum is relatively not common despite the superficial position of the testicles in the male perineum. Trauma to scrotum is divided into 3 broad categories on the basis of mechanism of injury. These are

1. Blunt trauma,
2. Penetrating trauma and
3. Degloving trauma

Blunt Trauma

Refers to injuries which are sustained from blunt (rounded objects), applied with severe force on to the testicle and scrotum (eg.) Kick to the area of groin.

Penetrating trauma

Refers to the injuries which are sustained from high velocity missiles or sharp objects (eg.) Stab wounds and gun shot wounds.

Degloving Trauma

These are not common with the skin of the scrotum sheared off (eg.) trapping of testicles in heavy machinery.

Fracture or testicular rupture refers to tunica albugineal tear resulting in exposure of the testicular content.

Frequency

Penetrating trauma will form 15% of cases.

Blunt Trauma accounts for 85% scrotal trauma.

Testicular rupture is associated with as many as 80% of haematoceles.

Etiology

Penetrating injuries -	Most commonly caused by gunshot injuries
Blunt injuries -	Less common causes – Falls, motor vehicle accidents, etc. Second most common cause – groin kick. Most common cause - sports injuries.
Degloving injuries -	Most commonly caused by industrial injuries.
Others -	Emasculation, self mutilation and stab injuries.

Pathophysiology

The layer that is injured during testicular rupture is the tunica albuginea. Intratesticular hemorrhage and extrusion of the seminiferous tubules may occur as a result of tear in the tunica albuginea.

This advances to oozing and hematocele formation in the tunica vaginalis.

Scrotal hematoma results from the injury to tunica vaginalis or its extension into the epididymis.

Testis is protected from minor external injuries by two factors. First, a layer of serous fluid which is thin separates the tunica vaginalis from tunica albuginea [(i.e.) Physiological hydrocele] and allows the free sliding of testis within the scrotal sac.

Second, the suspension of testis inside the scrotum is by the spermatic cord, allowing free movement within the genital area. In case of severe blunt trauma or penetrating trauma, these features which are insufficient to prevent testicular injury.

Clinical Features

The presentation of patients to the emergency department with a straightforward history of injury as soon as the occurence of event.

There will be associated nausea and vomiting along with severe scrotal pain in patients who have sustained intense blunt trauma.

There may be a possibility of epididymitis and torsion testis in evaluating the patient with history of minor trauma.

Physical examination shows a severely swollen tender testicle with visible hematoma. Perineal or scrotal ecchymosis may be present. As the patient suffers from severe pain, thorough examination of patient will be difficult and radiological investigation or surgical exploration may be needed.

Blunt injury to the testis may manifest as ruptured testis or hematocele. In a patient with hematoma and scrotal swelling, the complete absence of pain raises the possibility of spermatic cord torsion or testicular infarction.

For penetrating injuries, the exit and entrance sites of wound are determined. Additional associated injuries are demonstrated in 75% of men with penetrating trauma to genitalia. Injury to the opposite testis is common.

Investigations

Lab studies

Analysis of urine to rule out epididymo-orchitis or urinary tract infections.

Imaging studies

Scrotal Ultrasound imaging [15]

It is valuable in staging and diagnosing the testicular injuries . Significant injury to testicle can be safely excluded, if there is a normal blood flow with normal parenchymal pattern in cases of blunt trauma.

Contusion or bleeding of the testicular parenchyma demonstrates hyperechoic lesion. The rupture of the testis is demonstrated by localised discontinuity of tunica albuginea.

Doppler studies

Provides information regarding blood supply of the testis. The normalcy of vascular pedicle is indicated by blood flow to the testis. Torsion or devascularising injury that has occured to the spermatic cord shows the absence of flow.

Other Studies

MRI, Nuclear Imaging.

TREATMENT

A) Immediate scrotal exploration

1. Disruption of the tunica albuginea.
2. Penetrating and degloving injuries.
3. Scrotal Ultrasound images with colour dopper shows absence of blood flow.
4. The diagnostic uncertainty after proper radiological examination.
5. Clinical examination findings consistent with injury to testis.

Testicular injuries

Requires immediate repair. Inappropriate protracted expectant management leads to testicular infection, atrophy and necrosis. Spermatogenesis and hormonal function are hampered due to delay in repair.

The proper surgical management is adequate debridement of necrotic or devitalised tissue, proper attention to hemostasis and closing of the tunica albuginea with extensive antibiotic coverage.

- Injury to the epididymis or Vas deferens : Microsurgical repair is needed.
- Orchidectomy : Will be needed if entire testis is totally shattered or completely infarcted.
- Degloving injuries: Treated by the following three ways.
    1. The normal method is primary closure of the testis using the scrotal skin which is remaining. About 20% of original scrotal skin gives adequate coverage of contents of the scrotum. Adequate debridement and irrigation is needed before attempting primary closure.
    2. If the skin of the scrotum is sufficient, mobilise the testis to nearby area for coverage. The correct location is in subcutaneous thigh

pouch, delayed placement in scrotum in 4-6 weeks. The temperature in thigh is 10 degress lower which allows spermatogenesis.

3. At the last resort, the testicles are left exposed and apply dry to moist sodium chloride dressing until the formation of granulation tissue. Split thickness skin graft should be applied within one week.

Medical therapy

This is reserved for patients with minor trauma, where the testicles are spared and the violation of scrotum is absent. The usual treatment consists of

(i) NSAIDS and antibiotics

(ii) Ice packs

(iii) Bed rest for 24-48 hours

(iv) Scrotal support – which prevents the lifting of scrotum in the inner thigh.

Complications

Due to untreated testicular injuries :

- Torsion with necrosis
- Testicular or epididymal abscess
- Testicular infarction
- Infertility
- Atrophy – results from the trauma to testis.
- Due to scrotal exploration and salvage of testis.
    - Infection
    - Loss of testis
    - Bleeding.

Outcome

Surgical exploration of many blunt injuries and all penetrating injuries have proven to improve salvage rates of testis and decrease morbidity.

Early surgical intervention leads to shorter hospitalisation, higher salvage rate and more rapid recuperation.

Miscellaneous Acute Scrotal Pathology

1) Idiopathic Scrotal Edema : [6,8]

This is a process which is self limiting process of unknown cause that is usually not associated with erythema of scrotum. The scrotal tenderness is minimal and fever is absent, but there may be significant pruritus.

Although most cases are idiopathic, insect bite, trauma, allergic or chemical dermatitis and other potential known cause of scrotal inflammation may be responsible but undiagnosed.

Clinical examination should include a complete assessment of the perianal and perineal region to rule out edema of scrotum secondary to a contiguous process that is perirectal abscess.

Eventhough the scrotal wall is thickened, testis can be palpated in most cases. When there is a doubt in cause of scrotal edema, ultrasonographic examination with colour doppler studies should be done.

The disease is self limiting, so no therapy is indicated. Scrotal edema usually subsides in some days. There is no indication for the usage of antibiotics.

2) Henoch – Schonlein purpura : [6,8,18]

A child with Henoch-Schonlein purpura occasionally develops an acute scrotal swelling which is associated with a petechial rash. Both the testis and scrotal wall are involved. The condition usually decreases over some days. Management should be focussed towards the systemic disease.

3) Scrotal fat necrosis : [19]

This relatively uncommon condition is seen most exclusively in obese prepubertal boys.

Hypothermia and physical activity not necessarily traumatic are common preceding factors. Swimming in cold water or playing outdoors on a cool day would be typical examples.

The child complains of bilateral or unilateral scrotal mass. These masses are distinctly separate from cord structures and testicles. The fat necrosis lobules are gradually resolved over days 7 to 10. There is no confirmed indication for surgery in these cases.

4) Testicular Tumor : [1]

Sometimes a post pubertal male with neoplasm of testis may present with pain in the scrotum. There may be spontaneous beginning of swelling

and that may be related to trauma of scrotum. The testis is generally irregular, enlarged firm to hard and tender. The epididymis is mostly palpable. Sometimes reactive hydrocele is present.

Alpha fetoprotein and beta – HCG, Serum testicular tumour markers are typically raised. The procedure of choice is radical inguinal orchidectomy.

5.Ischemic Orchitis :

It is uncommon complication of groin hernioplasty. It has a sequel of testicular atrophy. The appearance of symptoms is 2-5 days post surgery. The spermatic cord and testis becomes hard swollen, painful and tender.

The entire process may completely resolve or end in atrophy of testis orchidectomy is rarely necessary as gangrene is unusual. The etiology of ischaemic orchitis is damage of the pampiniform plexus during surgery and thrombosis of the spermatic cord.

6.Hematocele[25]

Types

a) Recent Haematocele

- It is due to rupture of one of the vessels in the tunica causing bleeding into the sac.
- Often it may occur following aspiration of a hydrocele.
- It may be precipitated by trauma also.

Clinical features

- Sudden onset of pain and swelling after history of trauma.
- It is tender, warm, fluctuant, but nontransilluminant.
- Occasionally aggressive testicular tumour mimics the presentation of acute, recent haematocele.
    - USG of scrotum is done in such suspected cases to rule out neoplasm and also to find out the viability of testis.

Treatment : The scrotum is explored under general anaesthesia. The clot is evacuated and the wound is closed with a drain.

b) Chronic or old clotted haematocele

- It is usually due to slow, spontaneous haemorrhage into the tunica vaginalis, without any proper history of trauma.
- It is painless, hard, nontender, nonfluctuant, often calcified swelling, with loss of testicular sensation.
- Because of the constant pressure, testicular function and so testicular sensation is lost. It mimics testicular tumour in many aspect.
- USG of the scrotum is done.

Treatment is orchidectomy, as testis is functionless (Low orchidectomy through scrotal appraoch).

7) Pyocele[25]

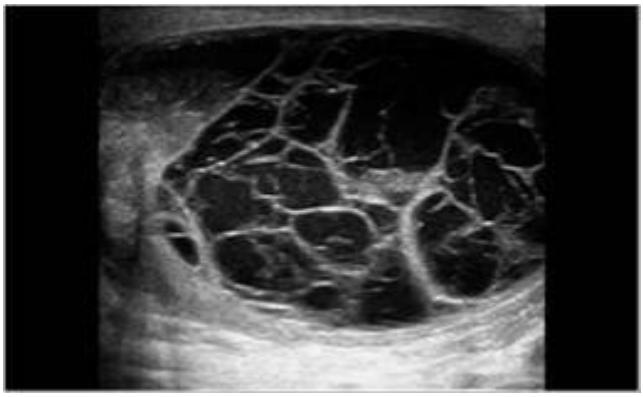
- It is collection of pus in the layers of tunica vaginalis.
- It can occur in a previously normal tunica or in a pre-existing haematocele or hydrocele (Which gets infected).

Features

- Fever, toxicity, tender swelling in the scrotum, with scrotal wall oedema.
- Often in young individuals, it may be difficult to differentiate this from the torsion testis.
- Pus under tension eventually causes infective thrombosis of testicular vessels, leading to nonviability of the underlying testis or testicular gangrene.

Treatment

- Antibiotics are started.
- Scrotum is explored immediately and pus is evacuated.
- viability of the testis is checked.
- If viable, pus is evacuated and sent for C/S, wound is closed with a drain.
- If the testis is not viable, then orchidectomy is done (after taking consent).
- When in doubt, always testis is left in place and observed. Often, testis will show signs of viability. If not, then orchidectomy is done at a later stage.



Ultrasound image showing pyocele

8) Scrotal wall cellulitis

It is the inflammation of the scrotal skin secondary to skin infection or testicular inflammation. It presents as an acute scrotal swelling and requires urgent evaluation.

Diabetics and immunocompromised are more susceptible. Failure to intervene early may result in progression with systemic manifestations.

9) Testicular abscess

It is usually a complication of epididymoorchitis which is severe which needs to be differentiated from other testicular pathology as they also presents with similar features.

Epidemiology

Most of the patients develops a abscess in testis as a consequence of untreated epididymoorchitis. It usually affects sexually active adult males.

Clinical presentation

Pain in the testis accompanied by swelling and fever. Sometimes it can result from bacterial infection of hematoma or of a area of infarction. If the rupture of the abscess occurs through the tunica albuginea ,scrotal abscess will develop.

Pathology

Testicular abscess occurs most commonly as consequence of epididymoorchitis and has the same pathogens. They can be broadly divided as

- Sexually transmitted

Neisseria gonorrhea

Chlamydia trachomatis

- Not sexually transmitted

Enterococcus species

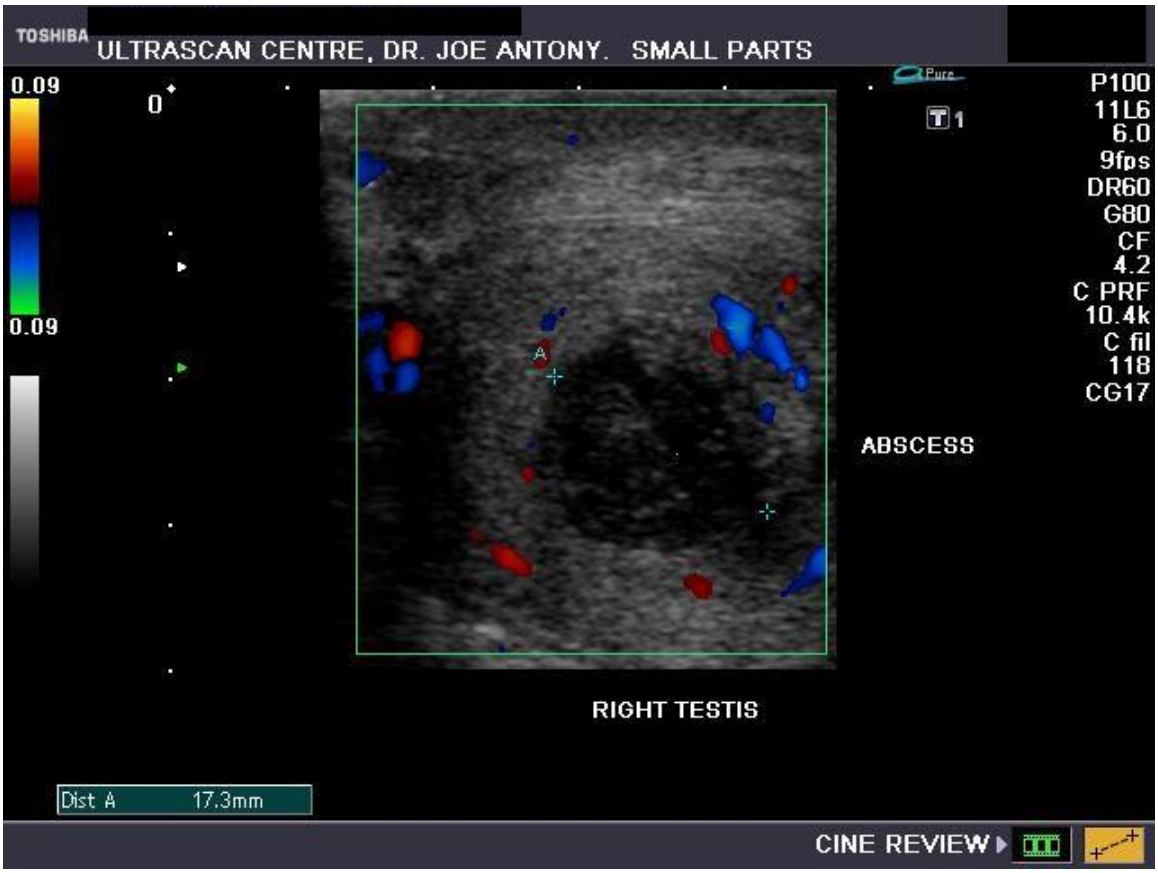
Coliforms

Streptococcus species

Staphylococcus

Radiographic features

Ultrasound features consists of



Colour Doppler study image showing the testicular abscess

- Focal region of altered echogenicity

  Will be isoechoic to the rest of the testis

  Usually complex cystic or solid structure

- Focal region of altered vascularity

  Focal avascular region

  Surrounding increase in vascularity

- Evidence of epididymis (in almost cases)
- Reactive hydrocele

    It is needed to evaluate for debris or encapsulation to rule out pyocele

  - Scrotal skin thickening

    Its necessary to assess for abscess of scrotal wall

  - Occasionally inrascrotal gas may be present

Treatment and prognosis

Management includes antibiotics,surgical debridement or even orchidectomy. If the approach is conservative, then serial ultrasonographic examinations should be done to monitor the progression of abscess.

If sucessfuly treated testis may return to normal.

MATERIALS AND METHODS

Source of Data

The material for this study was extracted from the patients presented to surgical outpatient department with swelling and pain in the scrotum, patients admitted as inpatients for complaints which were similar or any other patients referred for similar complaints during some other ailments from April 2014 to September 2014.

Method of collection of data

Clinical features, symptomatology, duration, investigations, operative findings, post operative complications were entered in the proforma and analysed. Total number of patients studied was 70.

Inclusion Criteria

All patients with complaints of acute swelling and pain in the scrotum irrespective of age.

Exclusion Criteria

Patients with painless swelling of scrotum and chronic scrotal pain

RESULTS AND DISCUSSION

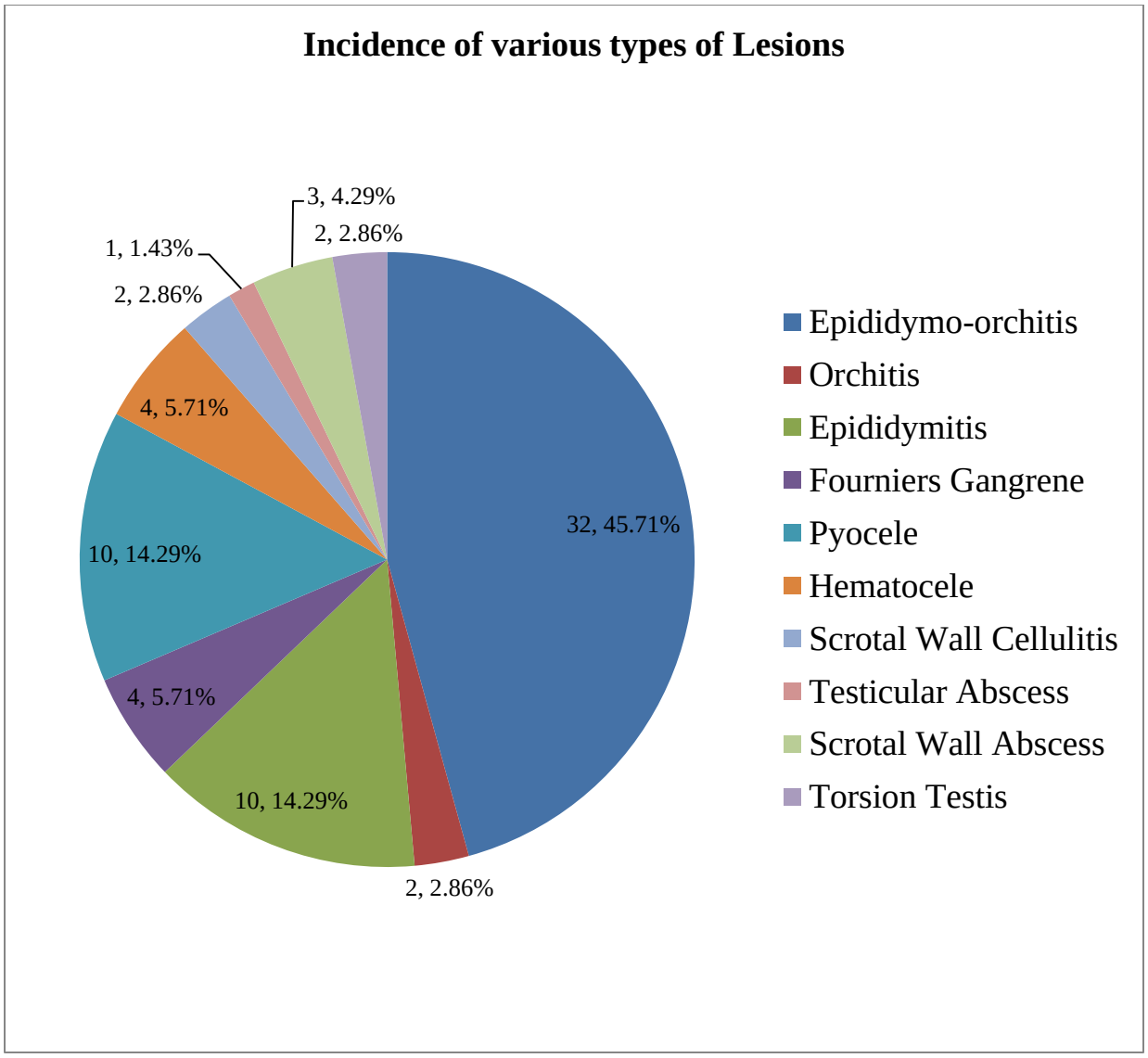
The study consists of analysis of 70 patients of acute scrotal swellings admitted in Government Royapettah Hospital, Kilpauk Medical College, Chennai from April 2014 to September 2014.

1. Incidence of various types of lesions

The incidence of different conditions which led to acute scrotum were detected as follows.

Incidence of various types of lesions

S.No.	Lesion	No. of patients	Percentage
1	Epididymo-orchitis	32	45.71
2	Orchitis	2	2.86
3	Epididymitis	10	14.29
4	Fournier's Gangrene	4	5.71
5	Pyocele	10	14.29
6	Hematocele	4	5.71
7	Scrotal Wall Cellulitis	2	2.86
8	Testicular Abscess	1	1.43
9	Scrotal Wall Abscess	3	4.29
10	Torsion Testis	2	2.86
	Total	70	



In our study acute epididymo-orchitis was the commonest cause of acute scrotal pathology followed by epididymitis and pyocele.

2 cases of testicular torsion were encountered. Hematocele was seen in 5.71% of cases. In a large case series reported by Cass et al[20] 20.67 cases of testicular torsion was encountered compared to 72.57% cases of epididymitis.

In the study conducted by N.H. Moharib et al[21] the most common cause of acute scrotum was torsion testis (33.92%) followed by torsion of Hydatid of Morgagni. Epididymitis was seen in 8.92% cases.

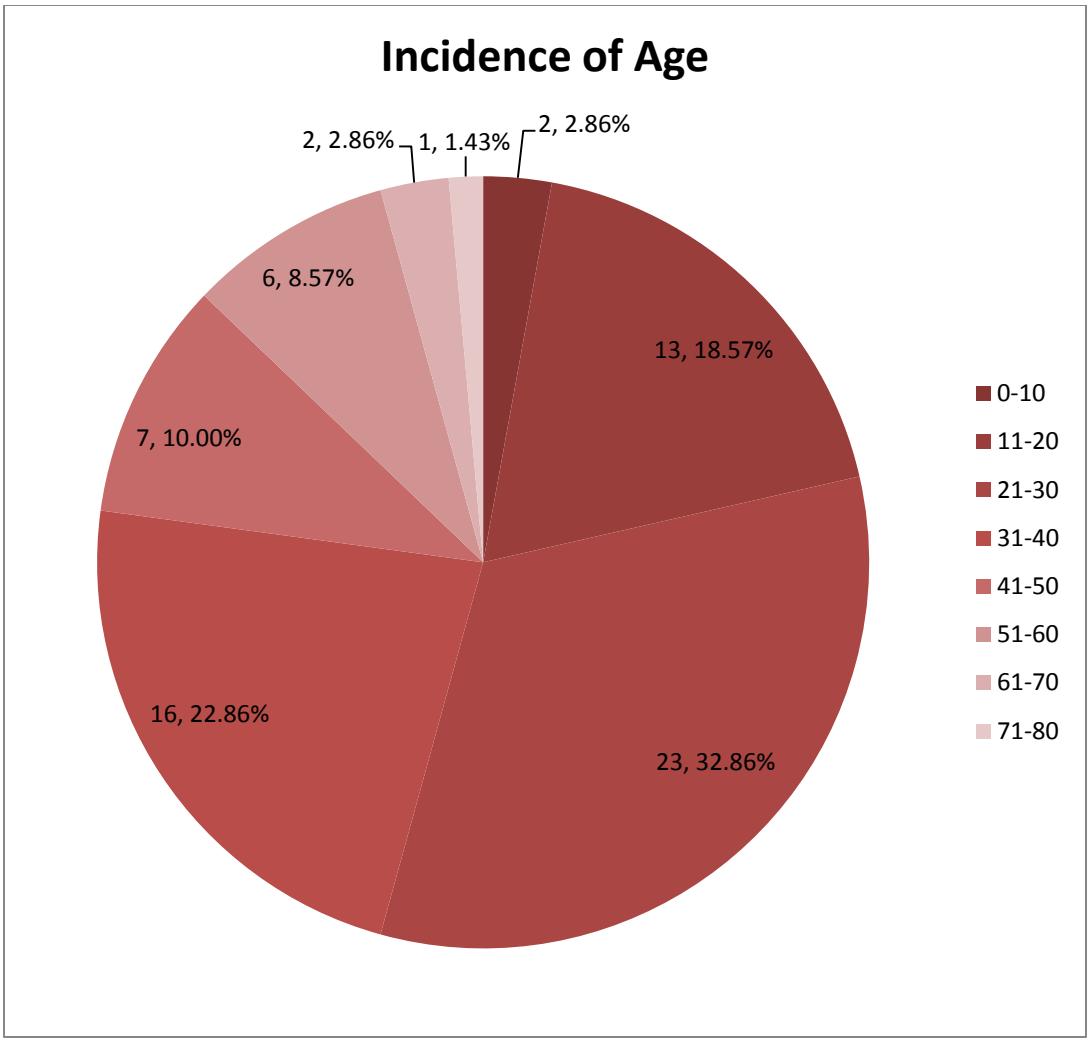
In the study of N.A.Watkin et al[22] testicular torsion was the most frequent diagnosis. 29% of the cases was found to be torsion of testicular appendage and 15% had epididymo-orchitis. The remaining 16% consisted of hematocele, hydrocele, etc.

Idiopathic scrotal wall edema, Henoch – Schonlein purpura testicular tumour, scrotal fat necrosis was not encountered in the study.

2. Incidence of Age

Incidence of Age

Age (years)	No. of patients	Percentage
0-10	2	2.86
11-20	13	18.57
21-30	23	32.86
31-40	16	22.86
41-50	7	10.00
51-60	6	8.57
61-70	2	2.86
71-80	1	1.43
Total	70	100.00



The overall incidence of age is shown in the table. The maximum incidence of acute scrotum occured between the group of 21-30 years of age.

Barker and Paper[21] in their study found that none of the patients were less than 14 years of age, whereas in our study only 3 patients were below 14 years of age.

Our study showed the incidence of age for acute epididymo-orchitis was maximum in the age group of 21-30 (17). The maximum incidence was 62% in a study conducted by Cass et al[20]

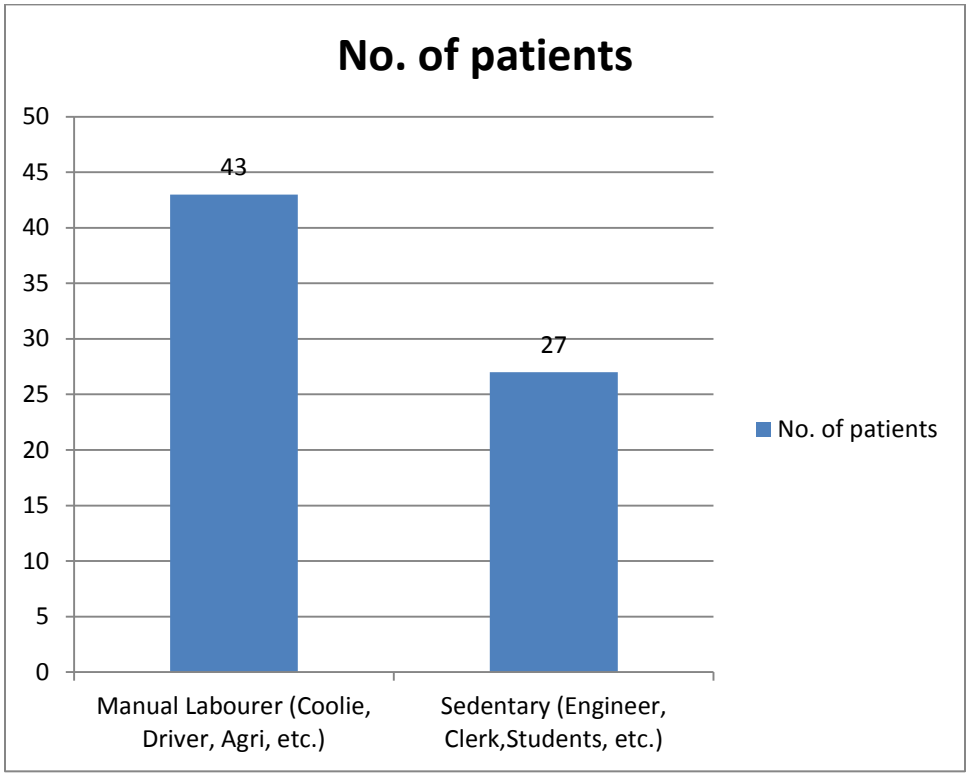
The mean age of occurence for the epididymo-orchitis was 26.56 years, which found to be different from the study done by N.A.Watkin et al[22] (21.3 years).

The mean age of occurrence of the Fournier Gangrene was 57.25 years, which with study done by R.B.Jones et al[13] was 51.3 Years.

3. Incidence of occupation

Incidence of Occupation

Occupation	No. of patients	Percentage
Manual Labourer(Coolie, etc.)	43	61.43
Sedentary (Engineer, Clerk,Students, etc.)	27	38.57
Total	70	



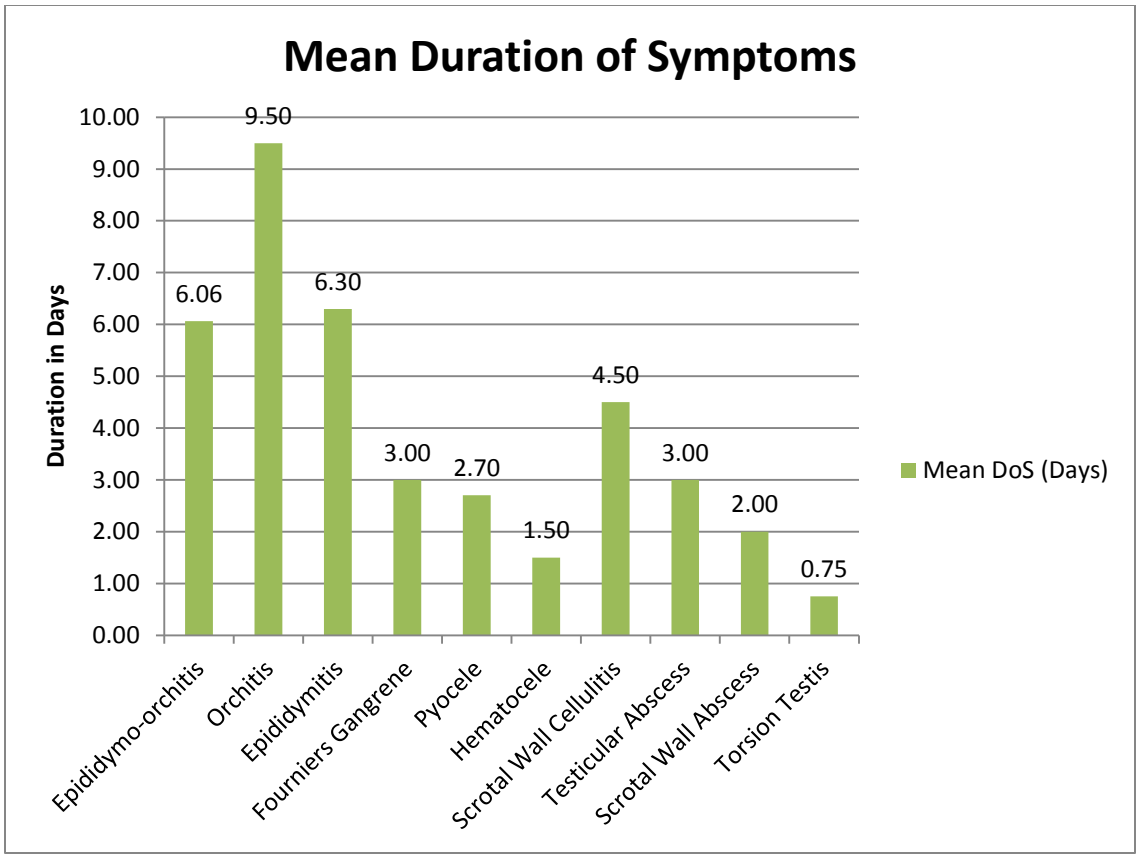
The acute swelling of scrotum was found to be more common in persons who were subjected to strenuous physical work.

In our study series of 70 cases, 61.43% of cases were manual labourers. Only 38.57% of cases were sedentary workers such as clerks, students, etc.

4. Duration of Symptoms

Mean Duration of Symptoms

S. No.	Lesion	Mean DoS (Days)
1	Epididymo-orchitis	6.06
2	Orchitis	9.50
3	Epididymitis	6.30
4	Fournier's Gangrene	3.00
5	Pyocele	2.70
6	Hematocele	1.50
7	Scrotal Wall Cellulitis	4.50
8	Testicular Abscess	3.00
9	Scrotal Wall Abscess	2.00
10	Torsion Testis	0.75



The duration of symptoms varied from few hours to some days. The shortest duration of symptoms detected by this study was 12 hours and longest duration was 11 days.

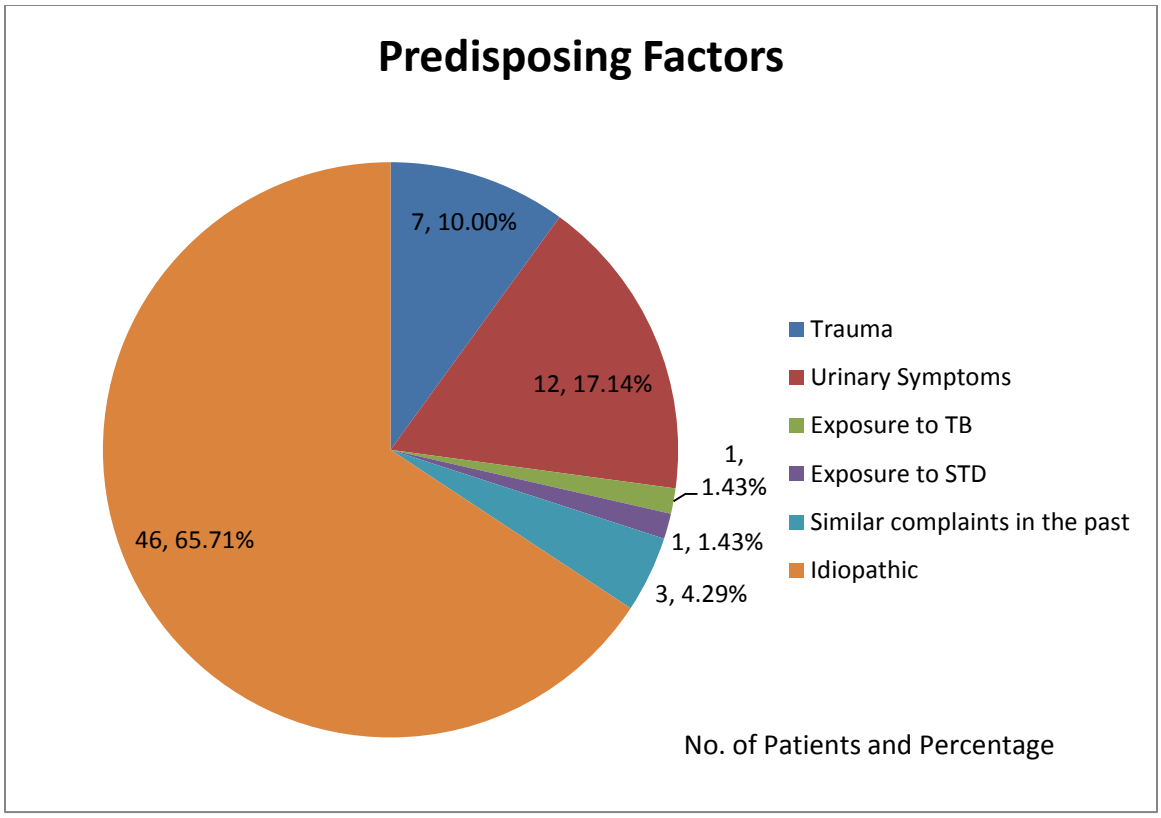
In a study conducted by Thorsteinn et al[10] the longest duration of symptoms was 21 days and shortest was 3 hours.

The average duration of symptom in Epididymo-orchitis was 6.06 days which differs from the study done by Ricardo et al[23.]The mean duration of symptoms from starting till presentation in cases of Forunier's gangrene was 3 days in this study.

5. Predisposing Factors

Predisposing Factors

History	No. of Patients	Percentage
Trauma	7	10
Urinary Symptoms	12	17.14
TB	1	1.43
STD	1	1.43
Similar complaints in the past	3	4.29
Idiopathic	46	65.71
Total	70	



In this study, history of trauma was present in 4 cases of hematocele, 2 cases of testicular torsion and 1 case of scrotal wall cellulitis.

History of urinary symptoms was present in 7 cases of epididymo-orchitis, 4 cases of pyocele and 1 case of epididymitis.

There was a history of similar complaints in the past in 1 case of epididymo-orchitis, 1 case of orchitis and 1 case of testicular abscess.

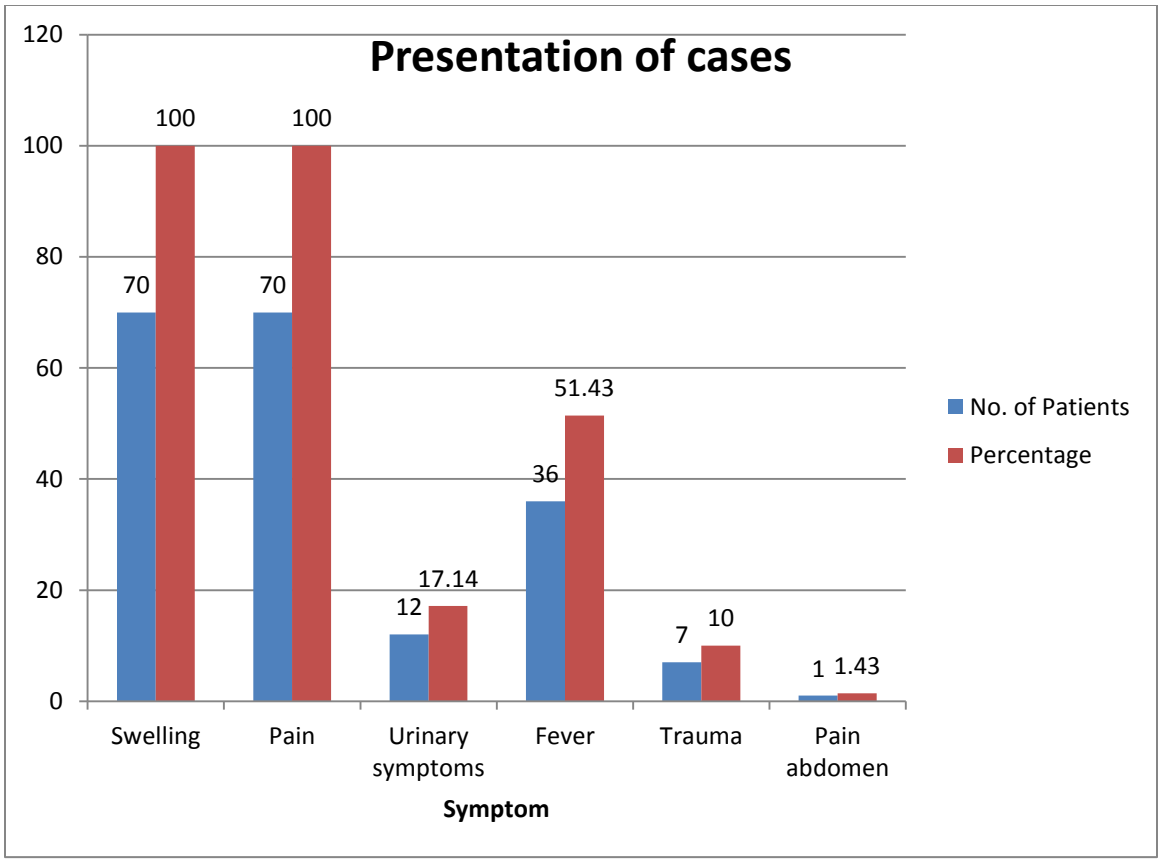
History of TB was present 1 case of epididymitis. History of STD was present in 1 case, 46 cases were idiopathic.

In the study done by Ricardo et al [23] in 45 cases, history of similar complaints in the past was found in 6 cases of testicular torsion and 2 cases of epididymitis. History of trauma was present in 3 cases of testicular torsion and 7 cases of epididymitis. Urinary symptoms was present in 1 case of testicular torsion and 7 cases of epididymitis.

6. Presenting Symptoms

Presentation of cases

Symptom	No. of Patients	Percentage
Swelling	70	100
Pain	70	100
Urinary symptoms	12	17.14
Fever	36	51.43
Trauma	7	10
Pain abdomen	1	1.43



All patients had scrotal swelling, associated with pain at the time of presentation. History of fever was present in 51.43% cases. 17.14% of patients had urinary symptoms. 12 patients had urinary symptoms and 1 patient had history of abdominal pain along with scrotal pain.

History of trauma was positive in 4 cases of hematocele, 2 cases of testicular torsion and 1 case of scrotal wall cellulitis.

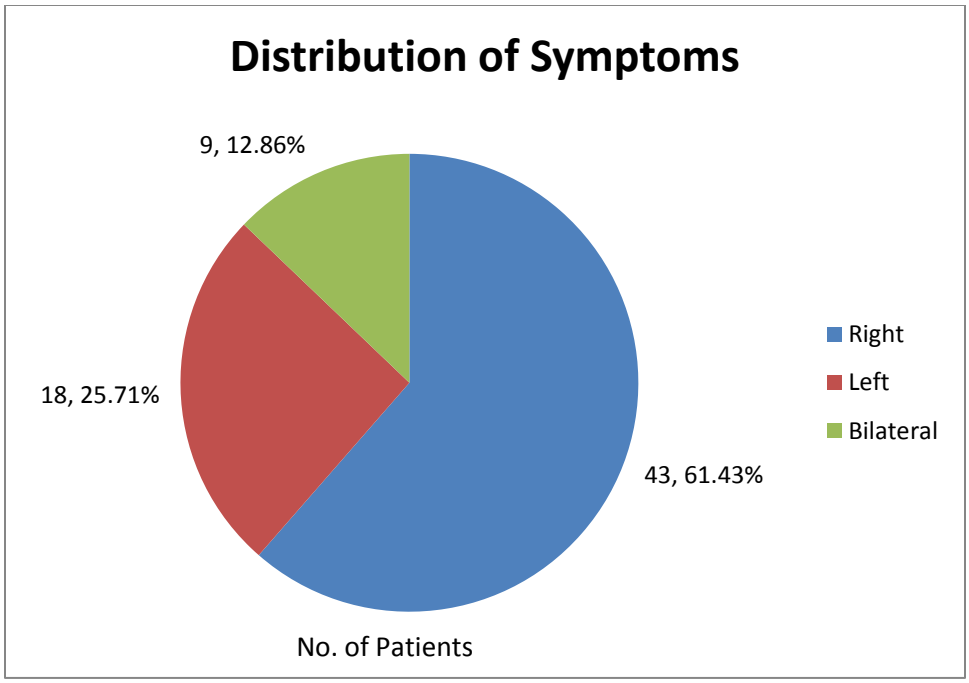
Urinary symptoms was present in 21.88% cases of epididymo-orchitis.

Fever was present in 51.43% of cases. 5 cases of epididymitis, 10 cases of epididymo-orchitis, 4 cases of Fournier's gangrene, 2 cases of orchitis, 10 cases of Pyocele, 2 cases of Scrotal wall Abscess, 2 cases of Scrotal Wall Cellulitis and 1 case of Testicular Abscess.

7. Distribution of Symptoms

Distribution of symptoms

SIDE	No. of Patients	Percentage
Right	43	61.43
Left	18	25.71
Bilateral	9	12.86
Total	70	100



In our study, it was detected that acute scrotal swelling was distributed more on the right side. Right side was involved 61.43% of cases and left side was involved in 25.71%. 12.86% of cases had bilateral involvement.

In this study Bilateral involvement was mostly seen in Fournier's gangrene and scrotal wall cellulitis.

8. Investigations

For all 70 cases, routine investigation like urine analysis, blood glucose, hemogram was done.

Urine culture and sensitivity was done for most of the cases especially who presented with urinary symptoms. Urine culture was positive in 11 cases. It was not done in 4 cases.

Pus culture and sensitivity was done for infected cases.

The urine examination showed presence of albumin in 2 cases. Urine sugar was present in 6 cases. The microscopic examination showed significant WBC's in 12 cases.

The increase in total leucocyte count in 30 cases showing acute infection. Thorsteinn et al [10] showed that leucocytosis was present in 44% of cases, whereas in our study was 42.85% of cases.

There was a increase in fasting blood sugar level in 6 cases. Most of the cases were Fournier's Gangrene.

VDRL and HIV ELISA was done in all the cases. Ultrasound scrotum was done in almost all cases except Fournier's Gangrene.

On Ultrasonography, testis was diffusely hypoechoic and swollen in case of acute epididymo-orchitis. The epididymis was swollen and hyperechoic.

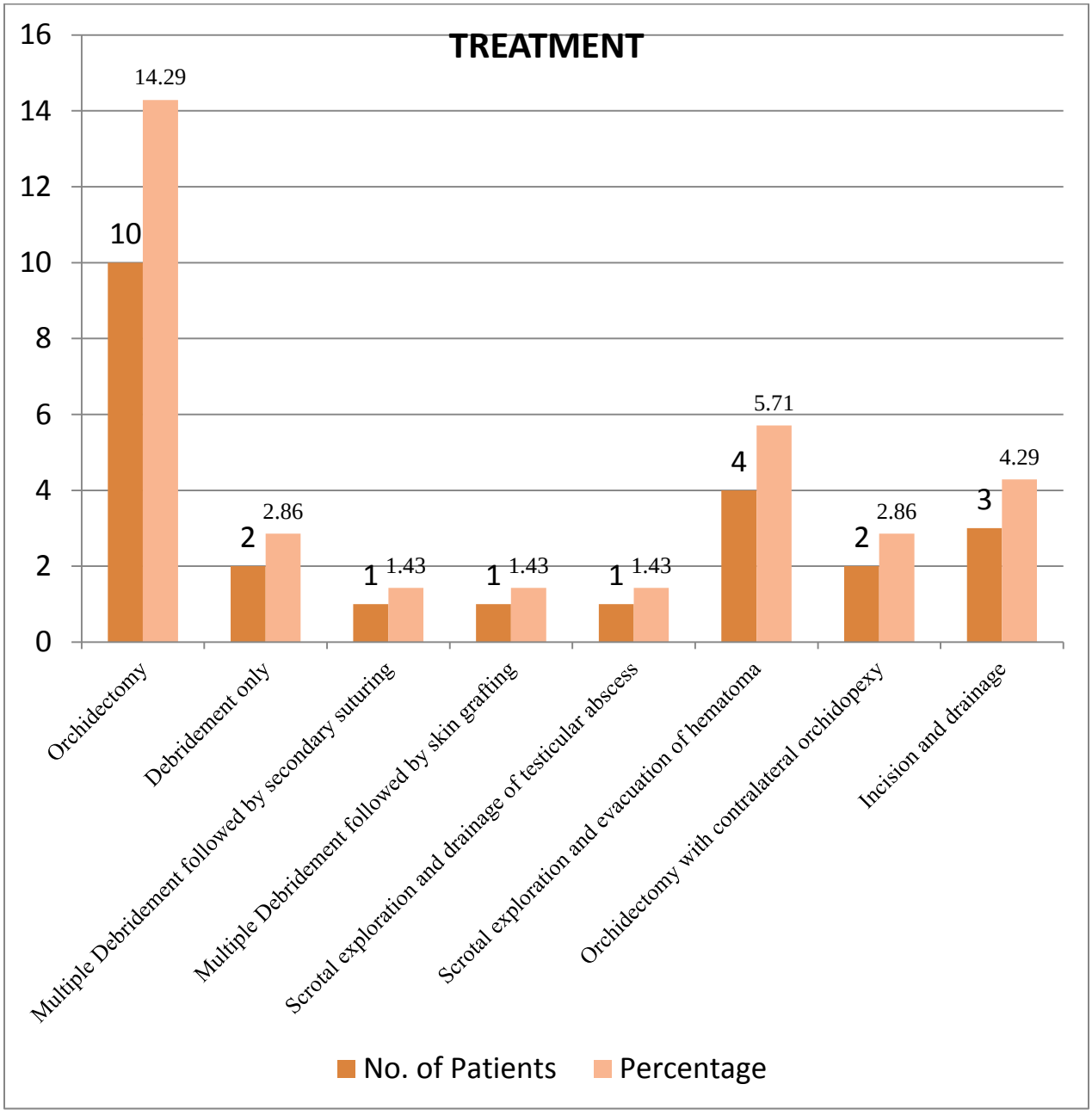
In case of pyocele and hematocele, the echogenecity surrounding the testis was not uniform showing presence of purulent collection with the scrotal sac thickened.

However, it is sometimes difficult to differentiate pyocele from hematocele sonographically. Scrotal wall found to be thickened and edematous in cases of scrotal wall cellulitis.

Special investigation like colour flow doppler was done in 6 cases. The flow was normal in 4 cases of hematocele and absent flow in 2 cases of torsion testis.

9. Treatment

S. No.	Treatment given	No. of Patients	Percentage
1	Conservative	46	65.71
2	Surgical	24	34.29
a.	Orchidectomy	10	14.29
b.	Debridement only	2	2.86
c.	Multiple Debridement followed by secondary suturing	1	1.43
d.	Multiple Debridement followed by skin grafting	1	1.43
e.	Scrotal exploration and drainage of testicular abscess	1	1.43
f.	Scrotal exploration and evacuation of hematoma	4	5.71
g.	Orchidectomy with contralateral orchidopexy	2	2.86
h.	Incision and drainage	3	4.29


TREATMENT
16
14
12
10
8
6
4
2
0
14.29
10
2.86
2
1.43
1
1.43
1
1.43
1
5.71
4
2.86
2
4.29
3
Orchidectomy
Debridement only
Multiple Debridement followed by secondary suturing
Multiple Debridement followed by skin grafting
Scrotal exploration and drainage of testicular abscess
Scrotal exploration and evacuation of hematoma
Orchidectomy with contralateral orchidopexy
Incision and drainage
No. of Patients
Percentage

Conservative Treatment

In this series of 70 cases, 46 cases (65.71%) were managed conservatively. 32 cases were epididymo-orchitis, 2 cases of orchitis, 10 cases of epididymitis, 2 cases of scrotal wall cellulitis were managed conservatively with antibiotics, analgesics, scrotal support and rest. Conservative management was given for 7 to 14 days .

Surgical Treatment

Scrotal exploration and drainage of testicular abscess was done in 1 case. Incision and drainage of scrotal wall abscess was done in 3 cases.

In Fournier's gangrene, only debridement was done in 2 cases, multiple debridement with secondary suturing was done in 1 case, multiple debridement followed by skin grafting was done in 1 case.

Scrotal exploration with evacuation of hematoma was done in all 4 cases of hematocele.

Orchidectomy was done in total of 10 cases in 10 cases with clinical diagnosis of pyocele was diagnosis. Orchidectomy with contralateral orchidopexy was done in 2 cases of testicular torsion.

In infected cases of acute scrotal swelling , antibiotics were given according to pus culture.

Results of Treatment

The cases treated with conservative management responded well with complete recovery. Postoperative recovery was uneventful in 66 cases and 4 cases developed wound infection.

The patients with conservative management had an average hospital stay of 8.5 days. The average hospital stay was 21.75 days in patients with Fournier's gangrene. The average hospital stay for surgically managed patients was 10.13 days.

SUMMARY

A clinical study of 70 cases of acute scrotal swellings were carried out during April 2014 to September 2014 in Government Royapettah Hospital, Kilpauk Medical College, Chennai.

In this present study, 70 cases of acute scrotal swellings were clinically analysed.

Acute swelling of scrotum appears to be a common condition which affects males. Among the cases of acute scrotal swellings epididymo-orchitis was the common cause followed by epididymitis and pyocele.

Even though testicular torsion was most common in all the other conducted studies only 2 cases of torsion testis was encountered in our study.

Acute swelling of scrotum was common in younger patients. The youngest patient in this study conducted was 10 years and the eldest was 80 years old.

The maximum incidence occured during the 3rd decade of life. The mean age of occurence for Fournier's gangrene in our study was 57.25 years and epididymo-orchitis was 26.56 years.

Acute scrotal swelling was found to be more common in people involved in strenuous physical work. Familial tendency was not observed in this study.

The factors like urinary symptom and trauma had a definite effect on disease. History of similar complaints in the past was observed in few cases.

The cause was not evident [(ie.) idiopathic] in 65.71 of cases.

The duration of symptom differs from few hours to days. The shortest symptom duration in this series was 12 hours. The patients who presented within 7 days of onset of symptom were about 61. The average duration of symptom in case of Fournier's gangrene was 3 days and for epididymo-orchitis was 6.06 days.

Swelling of scrotum which is associated with pain was the common presenting feature. Fever and urinary symptoms are the next commonest.

Involvement of scrotum on the right side is common, accounting for 61.43% of patients. Bilateral involvement was seen in almost 9 cases especially Fournier's Gangrene.

Hemogram and analysis of urine were not that conclusive but were more supportive to the clinical diagnosis. Accuracy of USG was excellent in this study.

Conservative treatment in the form of antibiotics, analgesics, rest and scrotal support was given for 7 to 14 days. The patients who underwent conservative management responded very well. In patients who were treated surgically 4 patients developed wound infection.

In infected cases antibiotics were given according to pus culture and sensitivity.

The period of hospitalisation was found to be more in Fournier's gangrene (mean 21.75 days).

CONCLUSION

Acute scrotal swelling are commoner in young persons with variable symptomatology. Such condition presenting to the emergency room needs meticulous examination, proper evaluation and adequate treatment.

The commonest cause of acute scrotum is epididymo-orchitis followed by epididymitis and pyocele.

Presence of similar complaints in the past, urinary symptom are important predisposing factors for acute scrotal swelling. Involvement of right side is much more common than the left side.

Routine investigations like hemogram, urine analysis are not very much conclusive to the confirmed final diagnosis but are supportive to clinical diagnosis. Special investigations like USG and colour Doppler are useful to the accurate diagnosis.

Since the disease of scrotum represents the inherent disease of epididymis, testis and other intrascrotal structure which may be affecting the entire life of the person in the form of sterility, they need aggressive management.

Conservative management with antibiotics, analgesics, scrotal support and rest is most effective in case of epididymo-orchitis. Emergency exploration of the scrotum proved to be the best care in case of pyocele, Hematocele, torsion testis, testicular abscess and Fournier's gangrene. It doesn't involve major expenses with negligible surgical mortality, also shown to be the best as confirmed diagnosis can be reached with almost all cases with exploration.

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ANNEXURE - I

LIST OF ABBREVIATIONS USED

aPTT	Activated partial thromboplastin time
BOO	Bladder Outlet Obstruction
BPH	Benign Prostatic Hypertrophy
CT	Computed Tomography
FDP	Fibrin Degradation Product
Hb%	Hemoglobin Percentage
HCG	Human Chorionic Gonadotropin
HIV	Human Immunodeficiency Virus
MRF	Mullerian Regression Factor
MRI	Magnetic Reasonance Imaging
NSAID	Non Steroidal Anti-inflammatory Drug
O_2	Oxygen
PT	Prothrombin Time
STD	Sexually Transmitted Diseases

TB	Tuberculosis
Tc	Technitium
USG	Ultrasonography
WBC	White Blood Count
EPO	Epididymo-orchitis
eg.	Example
i.e.	That is
DOS	Duration of Symptoms
VDRL	Venereal Disease Research Laboratory
ELISA	Enzyme Linked Immuosorbent Assay
cm	Centimetre
gm	Gram

ANNEXURE - II

Testicular abscess

Torsion testis which progressed to testicular gangrene

Fournier’s gangrene

Pyocele with testicular gangrene

Pyocele

Pyocele showing pus

ANNEXURE - III

PROFORMA

Name: Age : OP/ IP NO:

Occupation:

Duration of acute scrotal pain and swelling:

Other complaints: Fever/ urinary symptoms/ abdominal pain/ similar past complaints

H/O trauma:

TB/ STD:

General Examination

Temperature

Local examination:

Side

Warmth

Tenderness

Cord thickening

Testis

Cremasteric reflex

Penis

Investigations :

Haemogram:

Blood glucose (F):

Urine routine:

Urine culture:

Blood VDRL:

HIV ELISA:

USG report:

Colour Doppler:

Treatment

Conservative / operative

Operative procedure done:

Postoperative complication:

Duration of treatment:

Period of hospitalization:

ANNEXURE - IV

KEY TO MASTER CHART

SNo –Serial Number

OP – Outpatient

IP – Inpatient

No – Number

ML – Manual Labourer

Sd – Sedentary

DOS – Duration of Symptoms

TB – Tuberculosis

STD – Sexually Transmitted Diseases

Rt – Right

Lt – Left

Bl – Bilateral

F – Felt

Nf – Not Felt

N – Normal

TLC – Total Leucocyte Count

WBC – White Blood Cells

G – Growth

NG – No Growth

Nd – Not done

USG – Ultrasound

EPO – Epididymo-orchitis

Fn – Flow normal

Fa – Flow absent

C – Conservative

S – Surgery

I&D – Incision and Drainage

NA – Not Applicable

VDRL – Venereal Disease Research Laboratory

HIV ELISA – Human Immuno Deficiency Virus Enzyme Linked Immuosorbent Assay

WI – Wound Infection

C/s - Culture and sensitivity

SNo	NAME	AGE	IP/OP NO	OCCUPATION	DOS	TRAUMA	FEVER	URINARY SYMPTOMS	ABDOMINAL PAIN	TB	STD	SIMILAR COMPLAINTS IN PAST	SIDE	WARMTH	TENDERNESS	CORD THICKENING	TESTIS	CREMASTRIC REFLEX	PENIS	TLC	BLOOD GLUCOSE (Fasting)	URINE ALBUMIN	URINE GLUCOSE	URINE WBC	URINE CULTURE	PUS CULTURE	VDRL	HIV ELISA	USG (Suggestive of)	DOPPLER	DIAGNOSIS	MANAGEMENT	PROCEDURE	PERIOD OF HOSPITALISATION	DURATION OF TREATMENT	Post operative complications
1	Raja	25	OP-2015	ML	4	-	-	-	-	-	-	-	Rt	-	+	+	F	+	N	7245	100	Nil	Nil	2	NG	Nd	-	-	EPO	Nd	EPO	C		NA	10	-
2	Vinoth	29	OP-2045	Sd	5	-	-	-	-	-	-	+	Rt	-	+	-	F	+	N	6123	98	Nil	Nil	2	NG	Nd	-	-	EPO	Nd	EPO	C		NA	8	-
3	Munusamy	42	IP-5012	ML	3	-	+	+	-	-	-	-	Rt	+	+	+	Nf	-	N	12156	104	Nil	Nil	7	G	G	-	-	Pyocele	Nd	Pyocele	S	Orchidectomy	10	10	WI
4	Venkatesan	48	IP-5123	ML	4	-	+	-	-	-	-	-	Bl	+	+	+	F	-	N	13045	240	+	+	2	NG	G	-	-	Nd	Nd	Fourniers Gangrene	S	Debridement only	20	20	-
5	Kumar	24	OP-2078	ML	5	-	-	-	-	-	-	-	Lt	-	+	-	F	+	N	6545	108	Nil	Nil	2	NG	Nd	-	-	EPO	Nd	EPO	C		NA	7	-
6	Muthu	39	IP-5154	ML	1	+	-	-	-	-	-	-	Rt	-	+	-	Nf	-	N	7500	97	Nil	Nil	1	NG	Nd	-	-	Hematocele	Fn	Hematocele	S	Scrotal Exploration and Evacuation of Hematoma	7	7	-
7	Sathish	10	IP-5178	Sd	0.5	+	-	-	-	-	-	-	Lt	-	+	-	F	-	N	6598	95	Nil	Nil	0	Nd	Nd	-	-	Torsion Testis	Fa	Torsion Testis	S	Orchidectomy with Contralateral Orchidopexy	5	5	-
8	Prakash	32	OP-2100	ML	6	-	+	+	-	-	-	-	Bl	-	+	-	F	+	N	8548	106	Nil	Nil	5	G	Nd	-	-	EPO	Nd	EPO	C		NA	9	-
9	Visakan	27	OP-2143	Sd	8	-	+	-	-	-	-	-	Rt	-	+	-	F	+	N	9087	103	Nil	Nil	2	NG	Nd	-	-	Epididymitis	Nd	Epididymitis	C		NA	8	-
10	Pandian	53	IP-5247	ML	2	-	+	+	-	-	-	-	Rt	+	+	+	Nf	-	N	11899	106	Nil	Nil	3	G	G	-	-	Pyocele	Nd	Pyocele	S	Orchidectomy	9	9	-
11	Robert	12	IP-5289	Sd	2	-	-	-	-	-	-	-	Rt	+	+	-	F	+	N	10885	99	Nil	Nil	1	Nd	G	-	-	Scrotal Wall Abscess	Nd	Scrotal Wall Abscess	S	I &D	3	7	-
12	Vikram	25	OP-2272	Sd	4	-	-	-	-	-	-	-	Rt	-	+	-	F	+	N	7890	94	Nil	Nil	0	NG	G	-	-	Epididymitis	Nd	Epididymitis	C		NA	10	-
13	Jeyakumar	48	IP-5300	ML	1	+	-	-	-	-	-	-	Lt	-	+	-	Nf	-	N	7700	101	Nil	Nil	0	Nd	G	-	-	Hematocele	Fn	Hematocele	S	Scrotal Exploration and Evacuation of Hematoma	6	6	WI
14	Kannan	20	OP-2304	ML	7	-	+	-	-	-	-	-	Rt	-	+	+	F	+	N	10098	106	Nil	Nil	2	NG	Nd	-	-	EPO	Nd	EPO	C		NA	11	-
15	Kailash	29	OP-2378	Sd	6	-	+	-	-	-	-	-	Rt	-	+	-	F	+	N	9980	104	Nil	Nil	1	NG	Nd	-	-	EPO	Nd	EPO	C		NA	12	-
16	Moorthy	40	IP-5389	ML	2	-	+	-	-	-	-	-	Rt	+	+	+	Nf	-	N	11234	108	Nil	Nil	2	NG	G	-	-	Pyocele	Nd	Pyocele	S	Orchidectomy	8	8	-
17	Vinayagam	25	OP-2407	ML	5	-	-	+	-	-	-	-	Rt	-	+	+	F	+	N	12000	102	Nil	Nil	6	G	Nd	-	-	EPO	Nd	EPO	C		NA	9	-
18	Manivannan	34	IP-5405	ML	10	-	+	-	-	-	+	-	Rt	-	+	-	F	+	N	11098	97	Nil	Nil	2	NG	Nd	-	-	Orchitis	Nd	Orchitis	C		7	7	-
19	Sriram	23	OP-2670	Sd	5	-	-	-	-	-	-	-	Rt	-	+	-	F	+	N	7600	107	Nil	Nil	1	NG	Nd	-	-	EPO	Nd	EPO	C		NA	8	-
20	Sunil	31	OP-2787	ML	7	-	+	-	-	-	-	-	Lt	-	+	+	F	+	N	10896	97	Nil	Nil	0	NG	Nd	-	-	Epididymitis	Nd	Epididymitis	C		NA	7	-

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21	Pandurangan	65	IP-5679	ML	3	-	+	-	-	-	-	-	Bl	+	+	-	F	-	N	12367	101	Nil	Nil	2	NG	G	-	-	Nd	Nd	Fourniers Gangrene	S	Multiple Debridement followed by Secondary Suturing	18	18	-
22	Kathiravan	31	OP-5870	Sd	11	-	+	+	-	-	-	-	Rt	-	+	+	F	+	N	12089	96	Nil	Nil	5	G	Nd	-	-	EPO	Nd	EPO	C		NA	9	-
23	Arunmozhi	36	OP-2897	ML	9	-	-	-	-	-	-	-	Lt	-	+	-	F	+	N	8900	97	Nil	Nil	2	NG	Nd	-	-	EPO	Nd	EPO	C		NA	8	-
24	Pandiaraj	54	IP-5921	ML	5	-	+	-	-	-	-	-	Bl	+	+	-	Nf	-	N	11789	200	Nil	+	1	NG	Nd	-	-	Scrotal Wall Cellulitis	Nd	Scrotal Wall Cellulitis	C		10	10	-
25	Leo Joseph	25	OP-2916	Sd	7	-	-	-	-	-	-	-	Lt	-	+	-	F	+	N	9869	103	Nil	Nil	2	NG	Nd	-	-	EPO	Nd	EPO	C		NA	7	-
26	Kuberan	32	IP-6098	ML	8	-	+	+	+	-	-	-	Rt	+	+	+	F	-	N	12567	100	Nil	Nil	5	G	Nd	-	-	EPO	Nd	EPO	C		7	7	-
27	Thangaraj	49	IP-6123	ML	3	-	+	-	-	-	-	-	Lt	+	+	+	Nf	+	N	12890	98	Nil	Nil	1	NG	G	-	-	Pyocele	Nd	Pyocele	S	Orchidectomy	10	10	-
28	Babu	20	OP-3125	ML	4	-	-	-	-	-	-	-	Rt	-	+	-	F	+	N	7986	100	Nil	Nil	2	NG	Nd	-	-	EPO	Nd	EPO	C		NA	7	-
29	Sridhar	17	OP-6218	Sd	5	-	-	-	-	+	-	-	Lt	-	+	+	F	+	N	8765	99	Nil	Nil	1	NG	Nd	+	+	Epididymitis	Nd	Epididymitis	C		NA	8	+
30	Anand	19	OP-3179	ML	7	-	+	-	-	-	-	-	Lt	-	-	-	F	+	N	11345	90	Nil	Nil	2	NG	Nd	-	-	EPO	Nd	EPO	C		NA	7	-
31	Ravi	33	OP-3245	ML	3	-	-	-	-	-	-	-	Rt	-	+	-	F	+	N	7700	107	Nil	Nil	2	NG	Nd	-	-	EPO	Nd	EPO	C		NA	8	-
32	Palani	80	IP-6436	ML	2	+	-	-	-	-	-	-	Rt	-	+	-	Nf	-	N	9001	97	Nil	Nil	1	NG	Nd	-	-	Hematocele	Fn	Hematocele	S	Scrotal Exploration and Evacuation of Hematoma	8	8	-
33	Udaya Kuma	25	OP-3314	Sd	6	-	+	+	-	-	-	-	Rt	-	+	-	F	+	N	11230	109	Nil	Nil	4	G	Nd	-	-	EPO	Nd	EPO	C		NA	7	-
34	Dilli Babu	43	IP-6789	ML	4	-	+	-	-	-	-	-	Rt	+	+	-	Nf	-	N	12567	98	Nil	Nil	2	NG	G	-	-	Pyocele	Nd	Pyocele	S	Orchidectomy	10	10	WI
35	Sukumar	28	OP-3679	Sd	7	-	-	+	-	-	-	-	Rt	-	+	-	F	+	N	8769	105	Nil	Nil	3	G	Nd	-	-	EPO	Nd	EPO	C		NA	9	-
36	Murugesan	55	IP-6869	ML	2	-	+	-	-	-	-	-	Lt	+	+	+	Nf	-	N	13098	267	Nil	+	2	NG	G	-	-	Pyocele	Nd	Pyocele	S	Orchidectomy	14	14	-
37	Chinna	15	OP-3789	Sd	7	-	-	-	-	-	-	-	Rt	-	+	-	F	+	N	7678	96	Nil	Nil	0	NG	Nd	-	-	EPO	Nd	EPO	C		NA	7	-
38	Mani	49	IP-6986	ML	2	-	+	-	-	-	-	-	Bl	+	+	-	F	-	N	13456	300	Nil	+	2	NG	G	-	-	Nd	Nd	Fourniers Gangrene	S	Multiple Debridement followed by Skin Grafting	22	22	-
39	Paramasivam	17	IP-7056	Sd	3	-	+	-	-	-	-	-	Lt	+	+	-	F	+	N	11567	102	Nil	Nil	2	NG	G	-	-	Scrotal Wall Abscess	Nd	Scrotal Wall Abscess	S	I &D	5	5	-

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40	Guna	30	OP-3801	ML	9	-	+	-	-	-	-	+	Rt	-	+	-	F	+	N	10879	101	Nil	Nil	1	NG	Nd	-	-	Orchitis	Nd	Orchitis	C		NA	8	-
41	Sudhakar	31	OP-3869	Sd	5	-	-	-	-	-	-	-	Rt	-	+	+	F	+	N	9800	96	Nil	Nil	2	NG	Nd	-	-	EPO	Nd	EPO	C		NA	9	-
42	Sriram	18	OP-3961	ML	7	-	+	+	-	-	-	-	Lt	-	+	+	F	+	N	12000	98	Nil	Nil	7	NG	Nd	-	-	Epididymitis	Nd	Epididymitis	C		NA	14	-
43	Panner	57	IP-7165	ML	3	-	+	-	-	-	-	-	Rt	+	+	-	Nf	-	N	13000	109	Nil	Nil	2	NG	G	-	-	Pyocele	Nd	Pyocele	S	Orchidectomy	10	10	-
44	Jaffar	35	OP-3970	Sd	7	-	-	-	-	-	-	-	Lt	-	+	-	F	+	N	7900	101	Nil	Nil	2	NG	Nd	-	-	EPO	Nd	EPO	C		NA	11	-
45	John	32	IP-7263	ML	3	-	+	-	-	-	-	+	Rt	+	+	+	F	+	N	11980	230	Nil	+	2	NG	G	-	-	Testicular Abscess	Nd	Testicular Abscess	S	Scrotal Exploration and Drainage of Testicular Abscess	6	10	-
46	Viswa	25	OP-4055	ML	6	-	-	-	-	-	-	-	Rt	-	+	-	F	+	N	8999	102	Nil	Nil	1	NG	Nd	-	-	EPO	Nd	EPO	C		NA	11	-
47	Nidhi	32	IP-7280	ML	4	+	+	-	-	-	-	-	Bl	+	+	-	Nf	-	N	11209	98	Nil	Nil	2	NG	Nd	-	-	Scrotal Wall Cellulitis	Nd	Scrotal Wall Cellulitis	C		10	10	-
48	Suresh	15	OP-4215	Sd	7	-	-	-	-	-	-	-	Rt	-	+	-	F	+	N	8700	100	Nil	Nil	1	NG	Nd	-	-	EPO	Nd	EPO	C		NA	7	-
49	Sriman	27	OP-4300	Sd	8	-	-	-	-	-	-	-	Rt	-	+	-	F	+	N	9089	97	Nil	Nil	2	NG	Nd	-	-	Epididymitis	Nd	Epididymitis	C		NA	8	-
50	Ayyappan	40	IP-7300	ML	3	-	+	+	-	-	-	-	Rt	+	+	+	Nf	-	N	12980	100	Nil	Nil	5	G	G	-	-	Pyocele	Nd	Pyocele	S	Orchidectomy	8	8	-
51	Ramu	18	OP-4345	Sd	3	-	-	-	-	-	-	-	Rt	-	+	-	F	+	N	7689	97	Nil	Nil	2	NG	Nd	-	-	EPO	Nd	EPO	C		NA	9	-
52	Ramesh	15	IP-7478	ML	1	-	+	-	-	-	-	-	Rt	+	+	+	F	+	N	11234	98	Nil	Nil	1	NG	G	-	-	Scrotal Wall Abscess	Nd	Scrotal Wall Abscess	S	I &D	5	5	-
53	Durai	26	OP-4456	Sd	4	-	-	-	-	-	-	-	Lt	-	+	+	F	+	N	7869	101	Nil	Nil	2	NG	Nd	-	-	EPO	Nd	EPO	C		NA	9	-
54	Raghavan	56	IP-7564	ML	2	+	-	-	-	-	-	-	Rt	-	+	-	Nf	-	N	7699	97	Nil	Nil	2	NG	Nd	-	-	Hematocele	Fn	Hematocele	S	Scrotal Exploration and Evacuation of Hematoma	5	10	-
55	Dilip	10	IP-7658	Sd	1	+	-	-	-	-	-	-	Rt	-	+	-	F	-	N	8990	91	Nil	Nil	2	Nd	Nd	-	-	Torsion Testis	Fa	Torsion Testis	S	Orchidectomy with Contralateral Orchidopexy	10	10	-
56	Rajesh	18	OP-4578	Sd	7	-	-	-	-	-	-	-	Lt	-	+	-	F	+	N	7890	98	Nil	Nil	1	NG	Nd	-	-	Epididymitis	Nd	Epididymitis	C		NA	8	-
57	Suraj	29	OP-4767	ML	6	-	+	-	-	-	-	-	Rt	-	+	+	F	+	N	11567	101	Nil	Nil	2	NG	Nd	-	-	EPO	Nd	EPO	C		NA	9	-
58	Hussain	67	IP-7677	ML	3	-	+	-	-	-	-	-	Bl	+	+	-	F	-	N	11908	278	+	+	2	NG	G	-	-	Nd	Nd	Fourniers Gangrene	S	Debridement only	27	27	-

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59	Kiruba	26	OP-4876	Sd	5	-	-	-	-	-	-	-	Rt	-	+	-	F	+	N	7867	102	Nil	Nil	2	NG	Nd	-	-	EPO	Nd	EPO	C		NA	7	-
60	Soorya	28	OP-4887	ML	7	-	+	-	-	-	-	-	Bl	-	+	+	F	+	N	11345	107	Nil	Nil	1	NG	Nd	-	-	Epididymitis	Nd	Epididymitis	C		NA	7	-
61	Velan	45	IP-7897	ML	3	-	+	+	-	-	-	-	Lt	+	+	-	Nf	-	N	12384	99	Nil	Nil	5	G	G	-	-	Pyocele	Nd	Pyocele	S	Orchidectomy	10	10	WI
62	Dinesh	29	OP-4902	Sd	5	-	-	-	-	-	-	-	Rt	-	+	-	F	+	N	8687	101	Nil	Nil	2	NG	Nd	-	-	EPO	Nd	EPO	C		NA	7	-
63	Ruthras	54	IP-8012	ML	2	-	+	-	-	-	-	-	Rt	+	+	+	Nf	-	N	11234	99	Nil	Nil	1	NG	G	-	-	Pyocele	Nd	Pyocele	S	Orchidectomy	7	7	-
64	Tilak	28	OP-4934	Sd	4	-	-	-	-	-	-	-	Bl	+	+	+	F	+	N	8098	108	Nil	Nil	2	NG	Nd	-	-	EPO	Nd	EPO	C		NA	8	-
65	Ajith	31	OP-4954	ML	7	-	-	-	-	-	-	-	Lt	-	+	-	F	+	N	7567	97	Nil	Nil	2	NG	Nd	-	-	EPO	Nd	EPO	C		NA	9	-
66	Ruthran	24	OP-5012	ML	5	-	+	-	-	-	-	-	Lt	-	+	-	F	+	N	7676	98	Nil	Nil	2	NG	Nd	-	-	Epididymitis	Nd	Epididymitis	C		NA	7	-
67	Fazil	27	OP-5015	Sd	8	-	+	+	-	-	-	-	Rt	-	+	-	F	+	N	11209	102	Nil	Nil	4	G	Nd	-	-	EPO	Nd	EPO	C		NA	10	-
68	Ramados	31	OP-5234	ML	8	-	-	-	-	-	-	-	Rt	-	+	-	F	+	N	8767	101	Nil	Nil	2	NG	Nd	-	-	EPO	Nd	EPO	C		NA	7	-
69	Praveen	28	OP-5434	Sd	7	-	+	-	-	-	-	-	Rt	+	+	+	F	+	N	11236	91	Nil	Nil	1	NG	Nd	-	-	EPO	Nd	EPO	C		NA	8	-
70	Nithy	16	OP-5567	ML	5	-	-	-	-	-	-	-	Rt	-	+	-	F	+	N	8990	98	Nil	Nil	2	NG	Nd	-	-	Epididymitis	Nd	Epididymitis	C		NA	9	-